SAI-3M MS² SERVING AREA INTERFACE DESCRIPTION AND INSTALLATION

Contents Page

1. GENERAL

1.01 This section covers the description and installation of the SAI-3M serving area interface.

1.02 These closures are to be used as hard-wired interfaces between feeder and distribution cables in Type I, II and III dedicated plant.

1.03 Plastic insulated 22-, 24- and 26-gauge cable pairs are terminated on MS² modules within the closure.

1.04 The following points should be considered when placing the SAI interfaces:

(a) **Safety considerations:**

(1) Locate closure to provide maximum safety to the employees and protection of the plant from damage.

(2) Select locations clear of backing vehicles and other traffic.

(3) Locate closures behind curbs. Unprotected locations along streets without curbs should be the last resort. If no alternative exists, place bumper posts for protection.

(b) **Appearance considerations:** Select locations that are as inconspicuous as possible.

(c) **Other considerations:**

(1) Avoid locations that are subject to flooding during storm periods.

(2) Avoid locations near intersections. Clear major street corners by at least 50 feet.

(3) In areas that have been zoned commercial, avoid placing in parkways where extra-wide driveways are likely to be constructed.

2. DESCRIPTION

2.01 There are five basic sizes of closures, as shown in Table A.

TABLE A

MFG's NO.	CAPACITY	WIDTH	DEPTH	HEIGHT
* 4065	300	10 1/2"	7 1/2"	38 3/4"
4080	600	10 3/8"	12 1/2"	45"
4082	900	10 3/8"	12 1/2"	54 3/4"
* 4084	1200/1800	28"	10 1/2"	40"
4086	1800/2700	28"	10 1/2"	49 3/4"

* Available as pedestal or pole-mount

Pedestal-Type Closures

2.02 **4065 SAI (300-pair):** The 4065 cabinet consists of a top, hinged front doors equipped with two locks, a removable hinged panel and backboard assembly, bond bar, module mounting frame and base, spool for jumper wire, and adjustable wire run guide. Fig. 1 is an exploded view of the 4065 cabinet.

2.03 **4080 SAI (600-pair) — 4082 SAI (900-pair):** The 4080 and 4082 cabinets consist of a top, hinged front doors equipped with two locks, an internal bond bar, module mounting frame, a base, and two anchor stakes. Fig. 2 is an exploded view of the 4080 cabinet. The 4082 differs only in height.

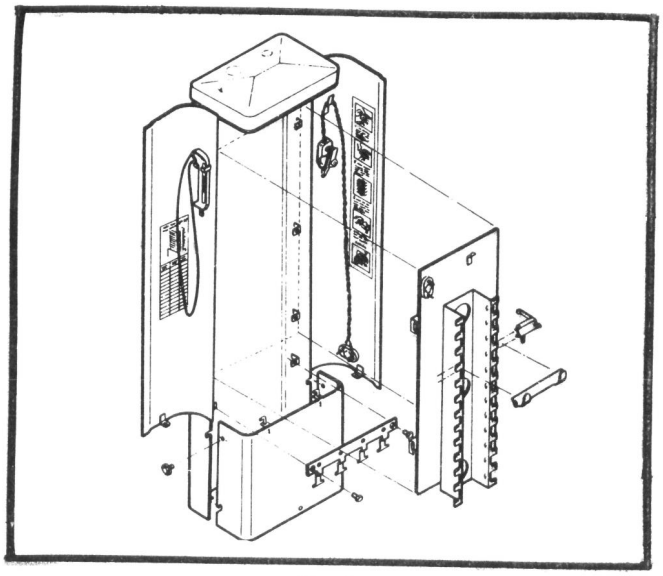


Fig. 1

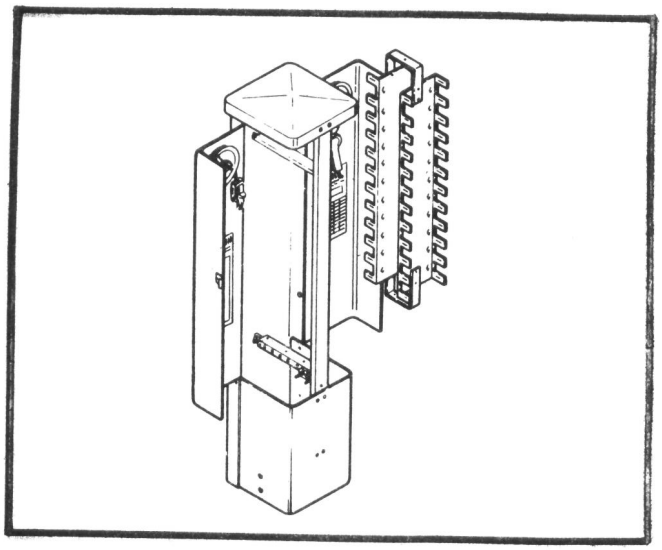
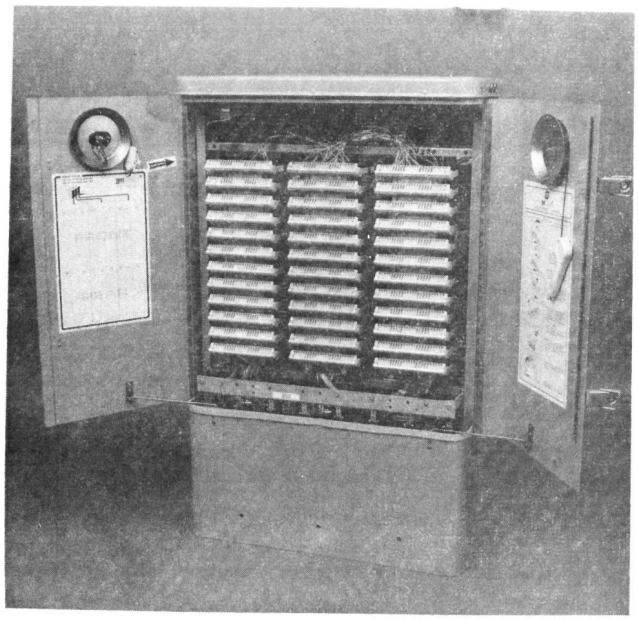


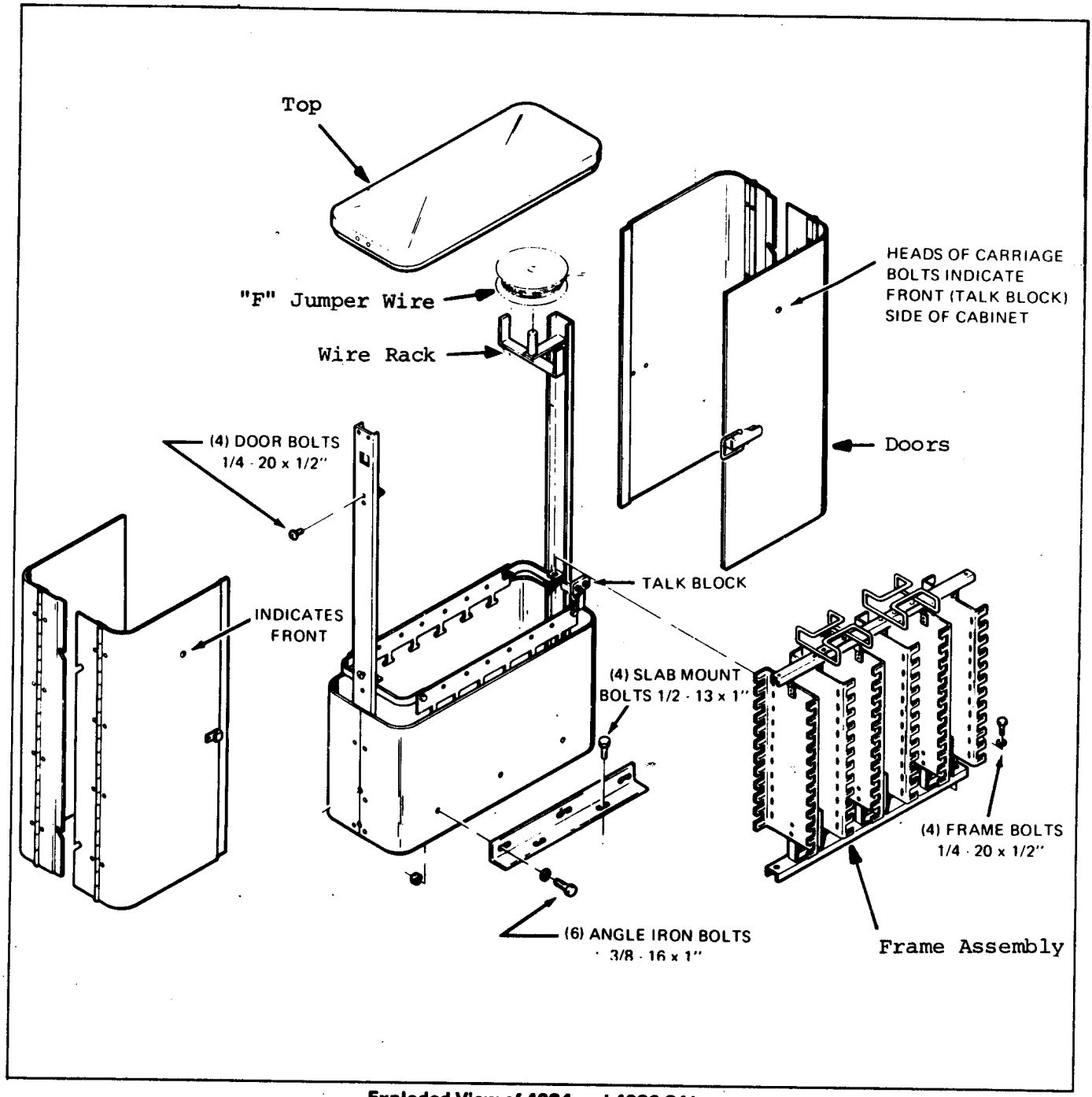
Fig. 2

2.04 4084 SAI (1200/1800 pair) — 4086 SAI (1800/2700 pair): The 4084 and 4086 cabinets consist of a top, hinged front and back doors equipped with two locks, a wraparound bonding bar, a base, a module mounting frame, two anchor stakes, and two slab-mount angle irons with necessary fasteners. Fig. 3 is a front view and Fig. 4 is an exploded view of the 4084 cabinet. The 4086 differs only in height.



4084 1200/1800 Interface

Fig. 3



Exploded View of 4084 and 4086 SAIs
Fig. 4

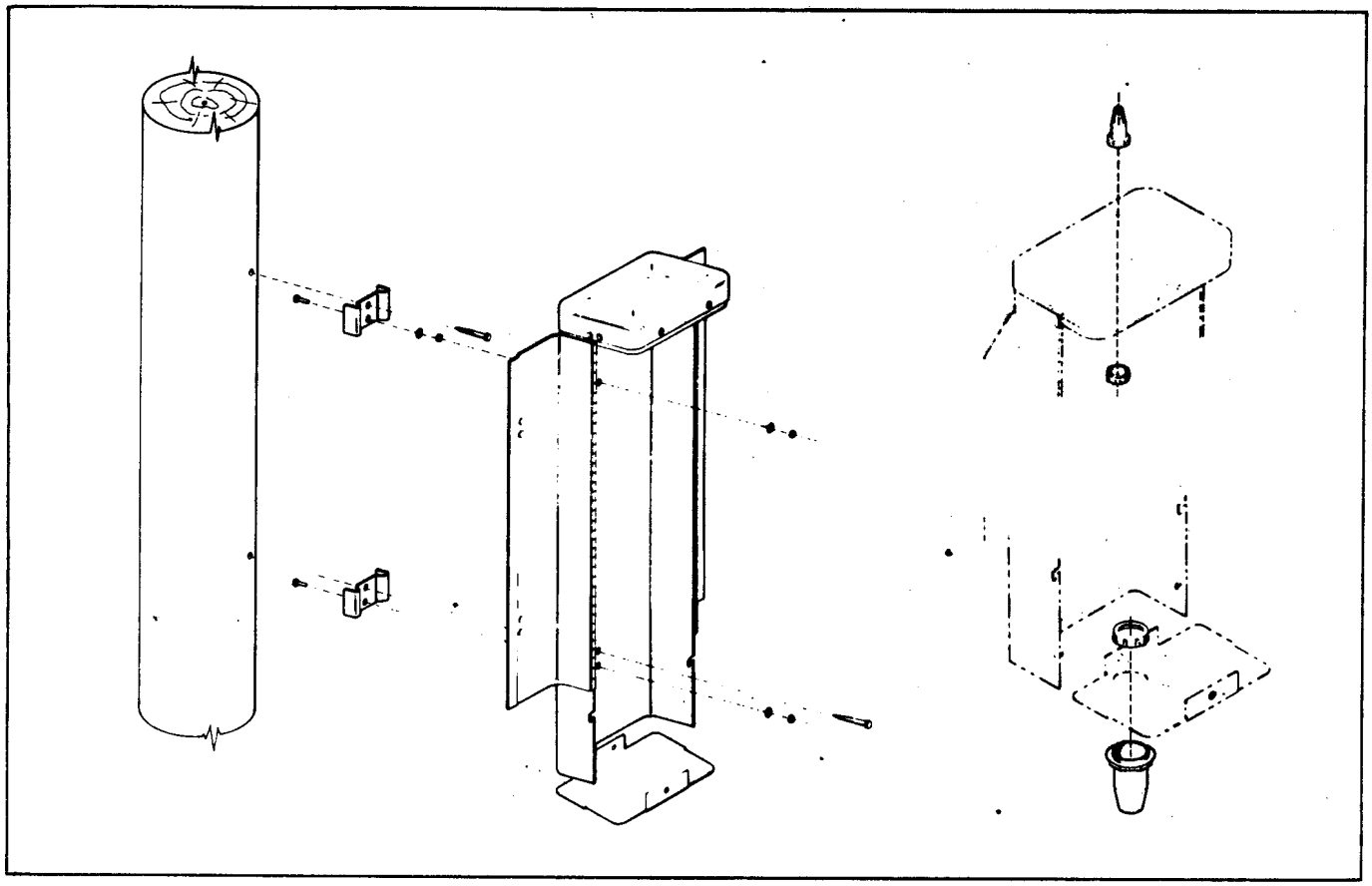


Fig. 5

Pole Mounted Closures

2.05 4065 (300-Pair) Pole-Mount Cabinet with 4098 Conversion Kit: The 4098 conversion kit adapts the 4065 pedestal cabinet to pole-mount applications. In addition to 4065 components, the 4098 conversion kit consists of top and bottom pole-mount brackets, plastic cable adapters, bottom plate, and necessary hardware. Fig. 5 is an exploded view of the 4065 cabinet with 4098 pole-mount conversion kit.

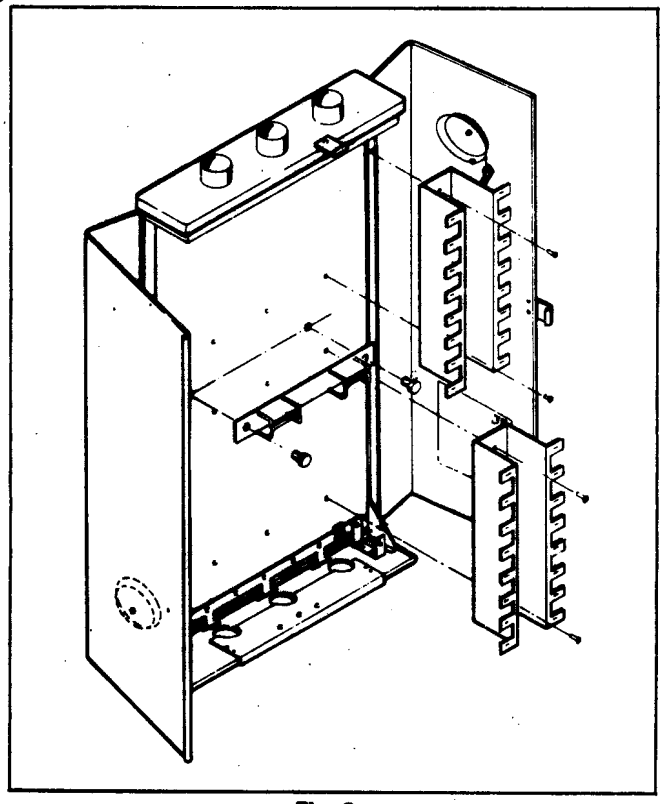
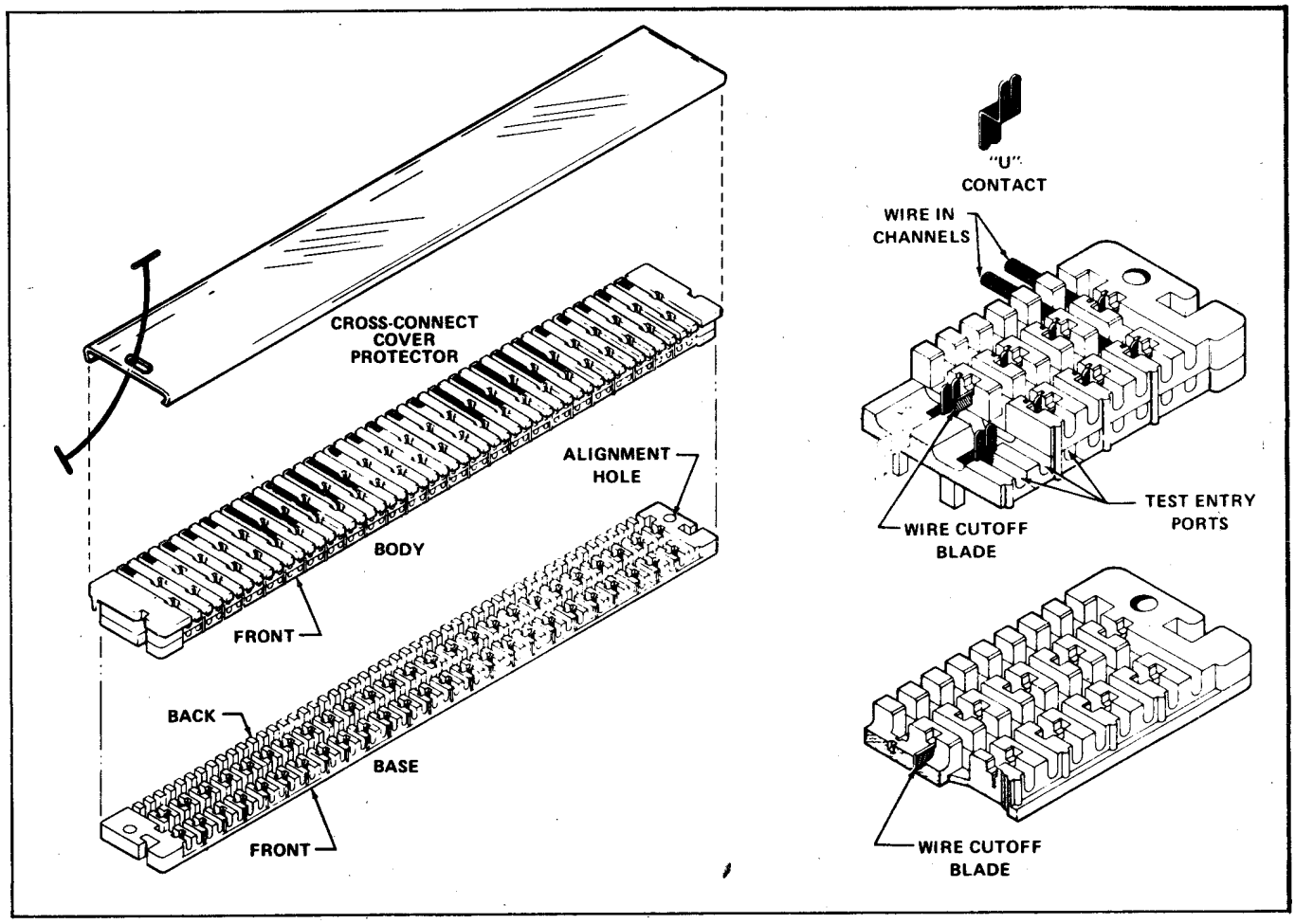


Fig. 6

2.06 4094 (1200-Pair) Pole-Mount Cabinet — 4095 (1800-Pair) Pole-Mount Cabinet: The 4094 and 4095 cabinets consist of a top, hinged front doors equipped with two locks, two internal bond bars, a center wire run guide, module mounting frames, and a predrilled backboard for pole mounting. Fig. 6 is an exploded view of the 4094 cabinet. The 4095 differs only in height.

MS² Cross-Connect Module

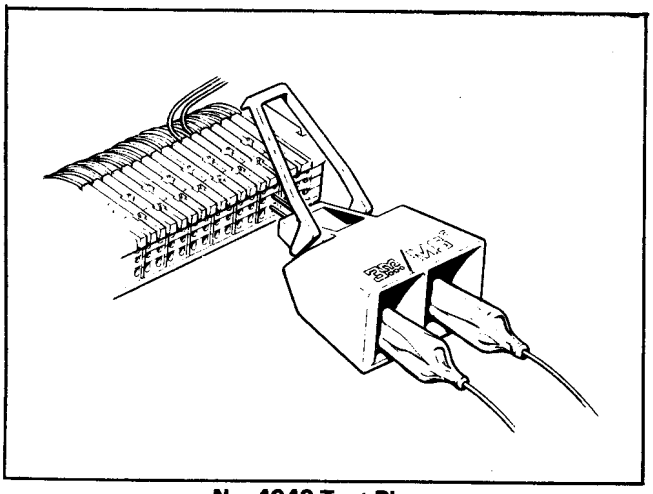
2.07 Each cross-connect application is based on the 25-pair MS² module, a two-part block which contains U-contacts, wire channels, and cutoff blades. Molded of polycarbonate with phosphor bronze U-contacts and stainless steel cutoff blades, the module body-cover assembly and base are crimped together to terminate feeder or distribution pair with a 3M hand or hydraulic crimping unit. The U-contacts strip the insulation and mate with the conductors, and the cutoff blades trim excess wire in the mechanical crimping operation. Binder groups may be identified on the module mounts, and pairs can be identified on tagging labels on the cover protector. The MS² module detail is shown in Fig. 7.



MS² Module
4010E (green) Feeder
4011E (blue) Distribution
Fig. 7

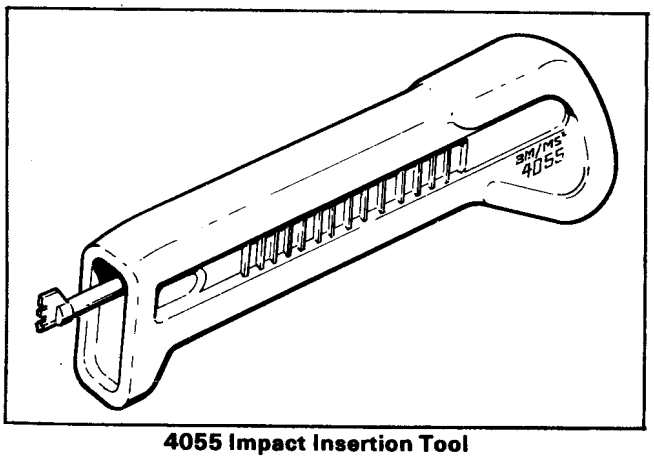
2.08 All closures come equipped with:

(a) 4049 pair test plug (Fig. 8).



No. 4049 Test Plug
Fig. 8

(b) 4055 impact insertion tool for placing jumpers (Fig. 9).



4055 Impact Insertion Tool
Fig. 9

(c) Jumper wiring instructions.

(d) Installation practice.

(e) Talk blocks.

(f) Spindle for jumper wire spool.

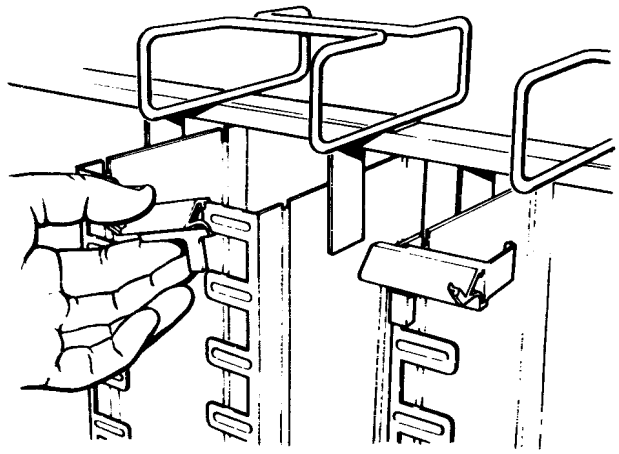
2.09 The following items must be ordered separately:

(a) 4010E and 4011E modules.

(b) 4060 mount sets: One set RIGHT and LEFT for mounting one module (Fig. 10).

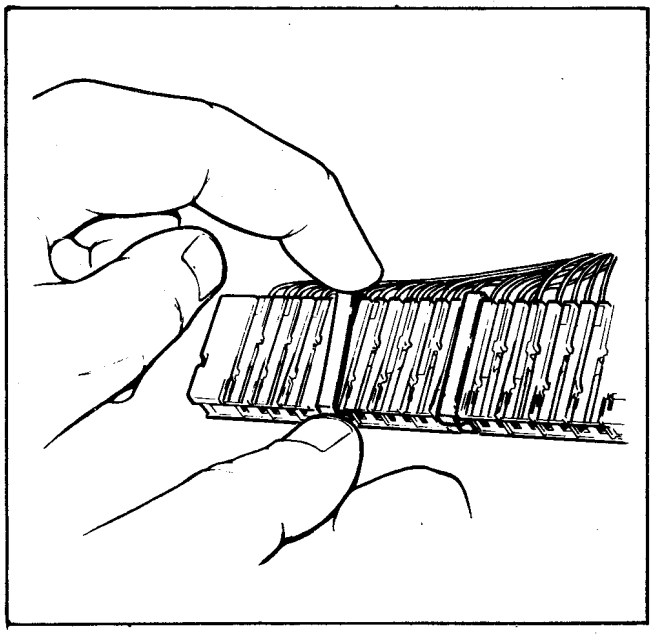
The following amounts of hardware are necessary to fully equip each closure:

Closure	Modules * (4010 & 4011)	Mount Sets (4060)
4065 (300 pr)	1 doz	1 doz
4080 (600 pr)	2 doz	2 doz
4082 (900 pr)	3 doz	3 doz
4084 (1800 pr)	6 doz	6 doz
4086 (2700 pr)	9 doz	9 doz



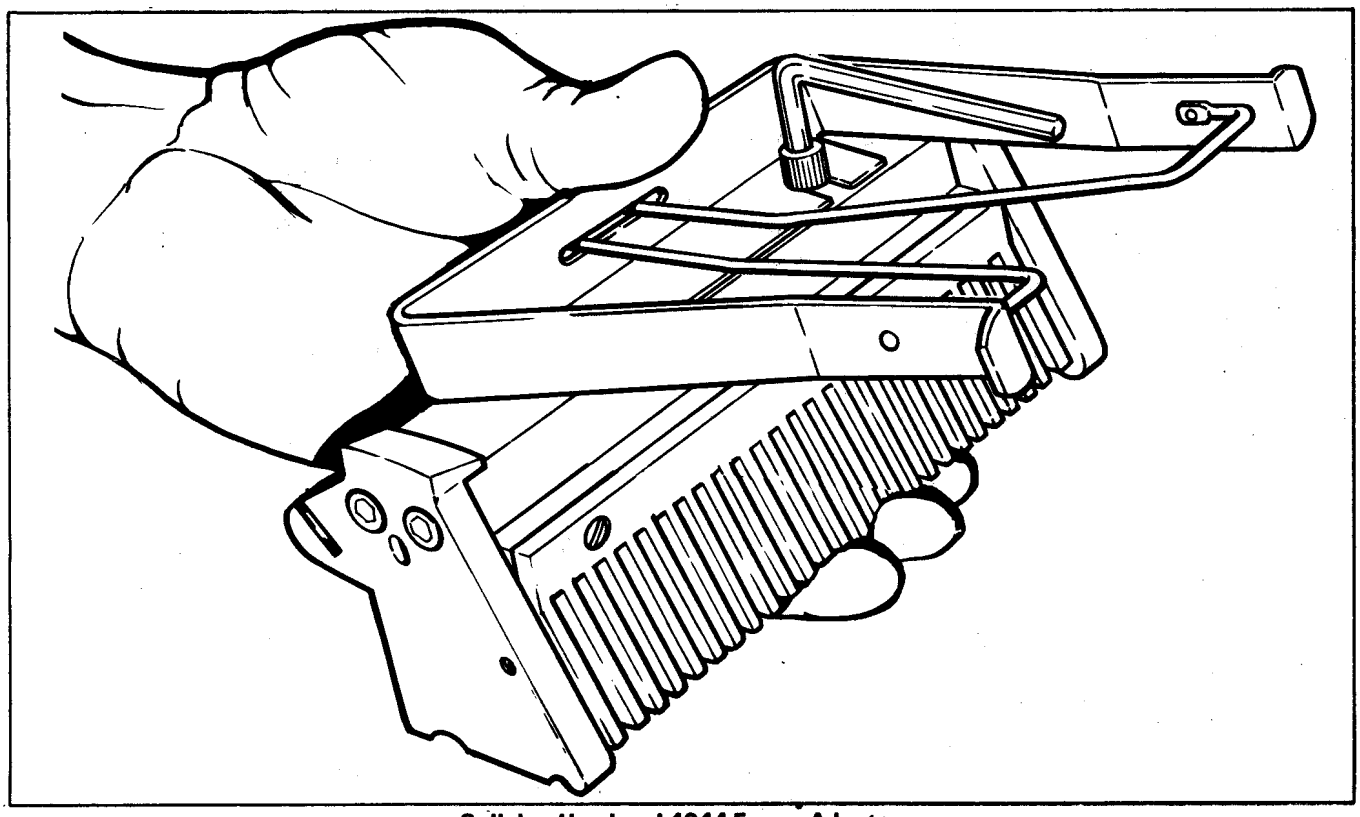
4060 Mount Set
Fig. 10

(c) 4014 priority circuit cap: Used to mark special circuits. These caps plug the test ports and cover wire terminations (Fig. 11).



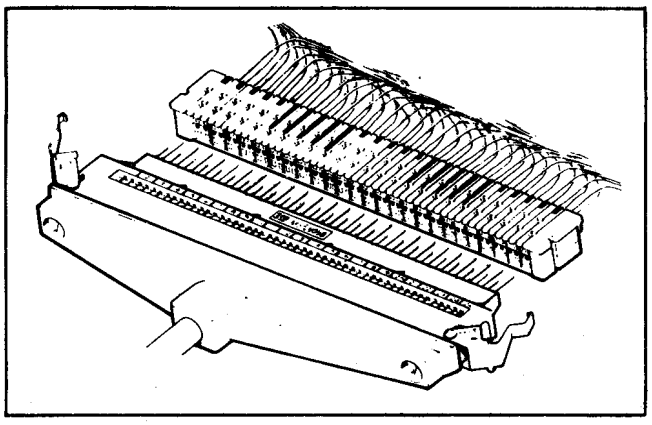
4014 Priority Circuit Caps
Fig. 11

(d) 4044 splicing head frame adapter: The adapter is used to hold the MS² splicing head when terminating conductors in the modules. Fig. 12 shows the adapter and the splicing head.



Splicing Head and 4044 Frame Adapter
Fig. 12

(e) 4048A probe test set: This is a 25-pair probe-type test set which allows a connection to be made with each conductor in an MS² module. The cinch-jones plug makes the probe compatible with most standard testing and tagging equipment. The probe should be inserted into the test entry ports **only** (Fig. 13).



4048 Probe Test Set
Fig. 13

3. INSTALLATION

3.01 Cable stub lengths should be a minimum of 5 feet for the 4065, 4080, and 4082 closures and 7 feet for the 4084 and 4086.

3.02 Install the 4065 (300-pair) pedestal closure, as follows:

(a) Carefully remove earth from around cables.

(b) Open doors on cabinet assembly. Cabinet has a removable hinged panel and backboard assembly for easy access.

(c) Fill excavation with coarse gravel to within 102 mm (4") of ground level.

(d) Place cabinet over cables in a vertical position so that the cabinet is centered in the excavation.

(e) Place anchor state (optional) to rear of cabinet. Protect stake top with wood block to prevent damage while driving. (Fig. 14).

(f) Using a sledge, drive until stake top is 406 mm (16") above ground level as shown in Fig. 15.

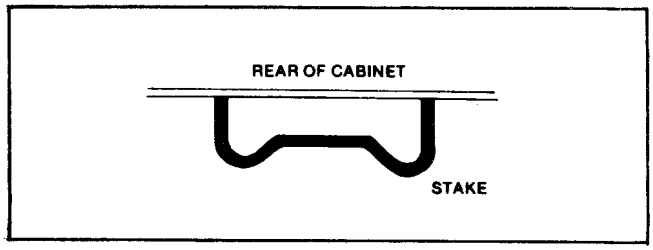


Fig. 14

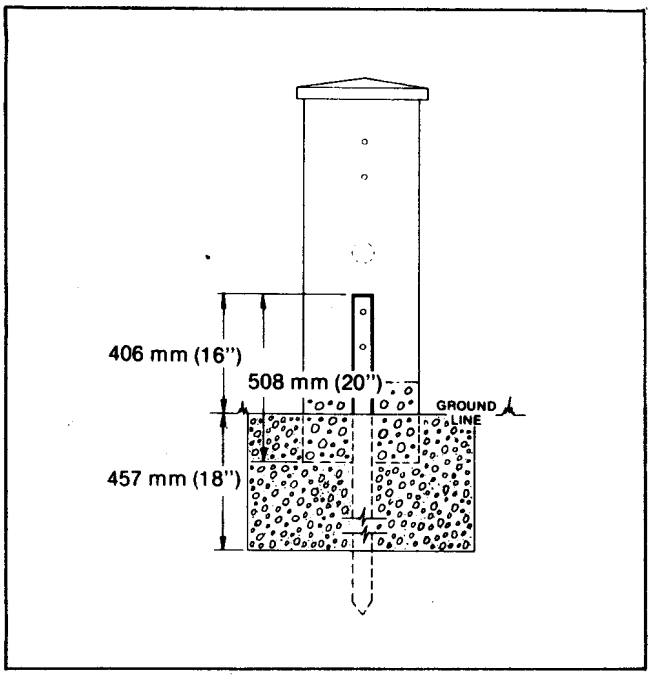


Fig. 15

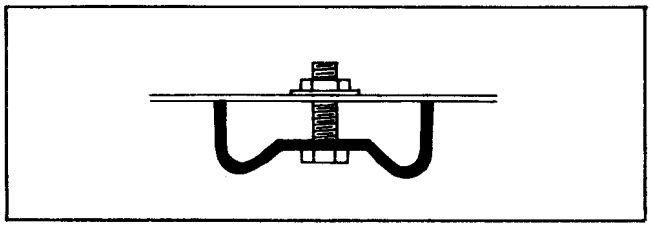


Fig. 16

Note: Do not hammer on the cabinet to drive the stake into the ground.

(g) Secure anchor stake to rear of cabinet with the 3/8" x 1" bolts and nuts provided. (Fig. 16).

(h) **Fill cabinet base with pea gravel to within 102 mm (4") of top of skirt.**

3.03 Install the MS² 4080 (600-pair) and 4082 (900-pair) pedestal interface as follows:

(a) Carefully remove earth from around cable.

(b) "U" channel frame is removable for easy access to base area of cabinet. To remove, simply unscrew the two fastening screws on the upper support bracket and the two fastening screws on the bond bar.

(c) Fill excavation with coarse gravel to within 153 mm (6 in.) of ground level.

(d) Place cabinet over cables in a vertical position so that the cabinet is centered in the excavation.

(e) Place anchor stake next to cabinet side. (Protect stake top with wood block to prevent damage while driving.)

(f) Using a sledge, drive until stake top is at ground level. (Fig. 17). Repeat for opposite side.

Note: Do not hammer on the cabinet to drive stakes into the ground.

(g) Align and secure anchor stakes to cabinet with the 3/8" x 1" bolts and nuts provided.

(h) **Fill cabinet base with pea gravel to within 102 mm (4 in.) of top of skirt.**

3.04 Concrete slabs are recommended for the MS² 4084 and 4086 pedestal cabinets. Install as follows:

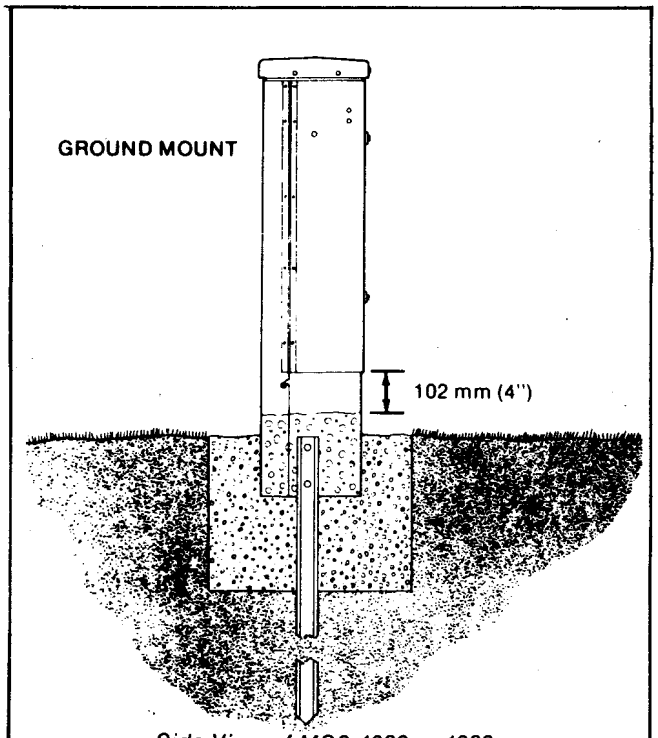
(a) Ground preparation:

(1) Excavate slab site to a depth of 305 mm (12 in.) below ground level, allowing for a slab of dimensions 1.8 m (6 ft.) x 1.8 m (6 ft.)

(2) **Fill excavation with coarse gravel to within 102 mm (4 in.) of ground level.**

(b) Form preparation:

(1) Set forms for a 1.8 m (6 ft.) x 1.8 m (6 ft.) x 102 mm (4 in.) slab, the top center of the slab being at or slightly above ground level. Slope slab away from center at the rate of 6 mm (1/4 in.) per running foot.



Side View of MS2 4080 or 4082 Ground Mount Installation.

Fig. 17

(2) Construct template for cabinet base according to the dimensions given in Fig. 18.

(3) Attach 13 mm (1/2 in.) x 114 mm (4.5 in.) hex-head bolts to template as indicated in Fig. 18.

(4) Center template in slab excavation and level, pushing template down into gravel so that top is flush with forms.

(5) Place concrete reinforcing rods or wire mesh in slab area.

(6) Pour and finish slab.

(7) After cement has cured sufficiently, remove nuts from anchor bolts and remove template from slab.

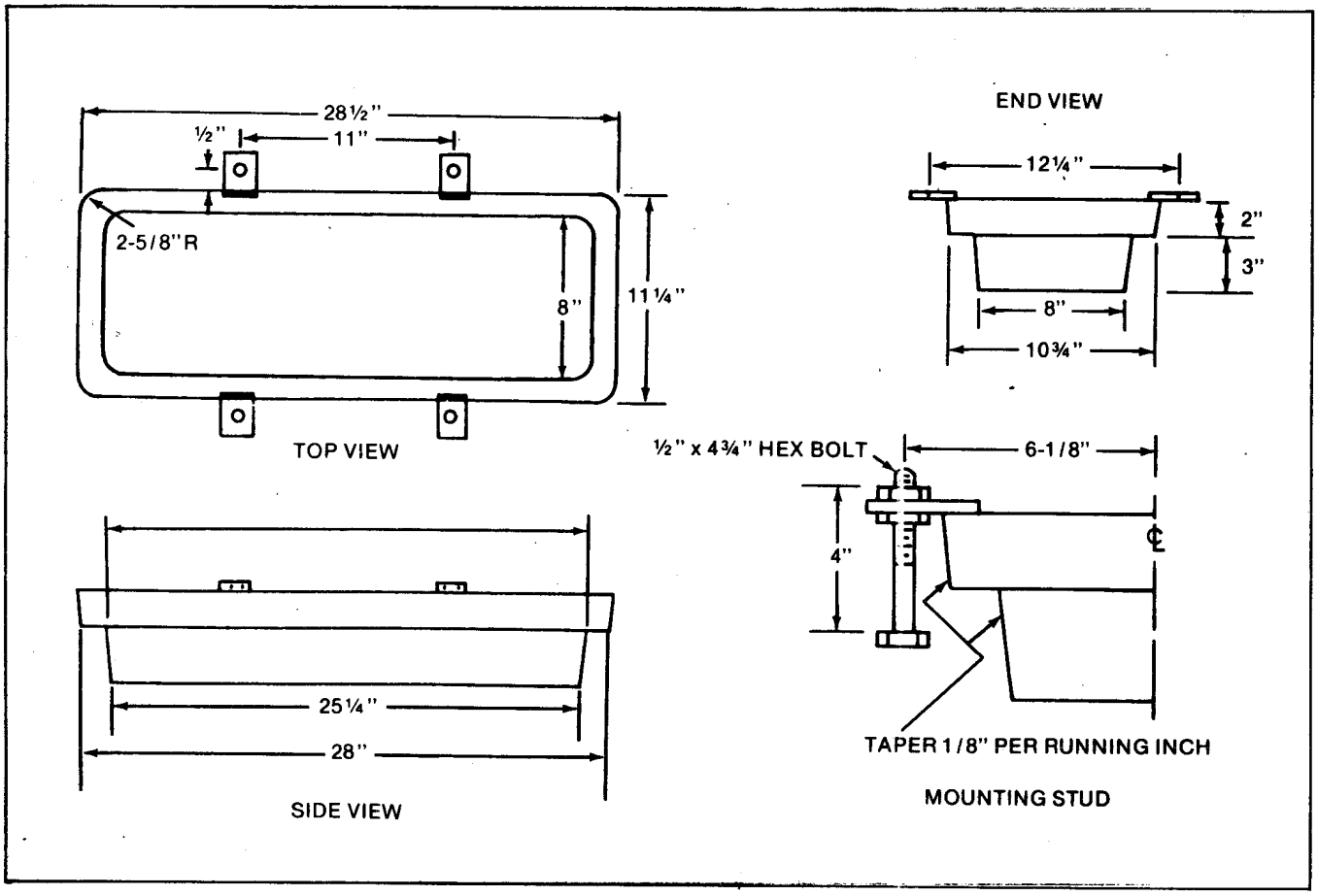


Fig. 18

(c) Mounting of cabinet:

(1) Remove bolts from side of cabinet and remove doors by lifting up and out. Replace bolts in cabinet so they will not be lost.

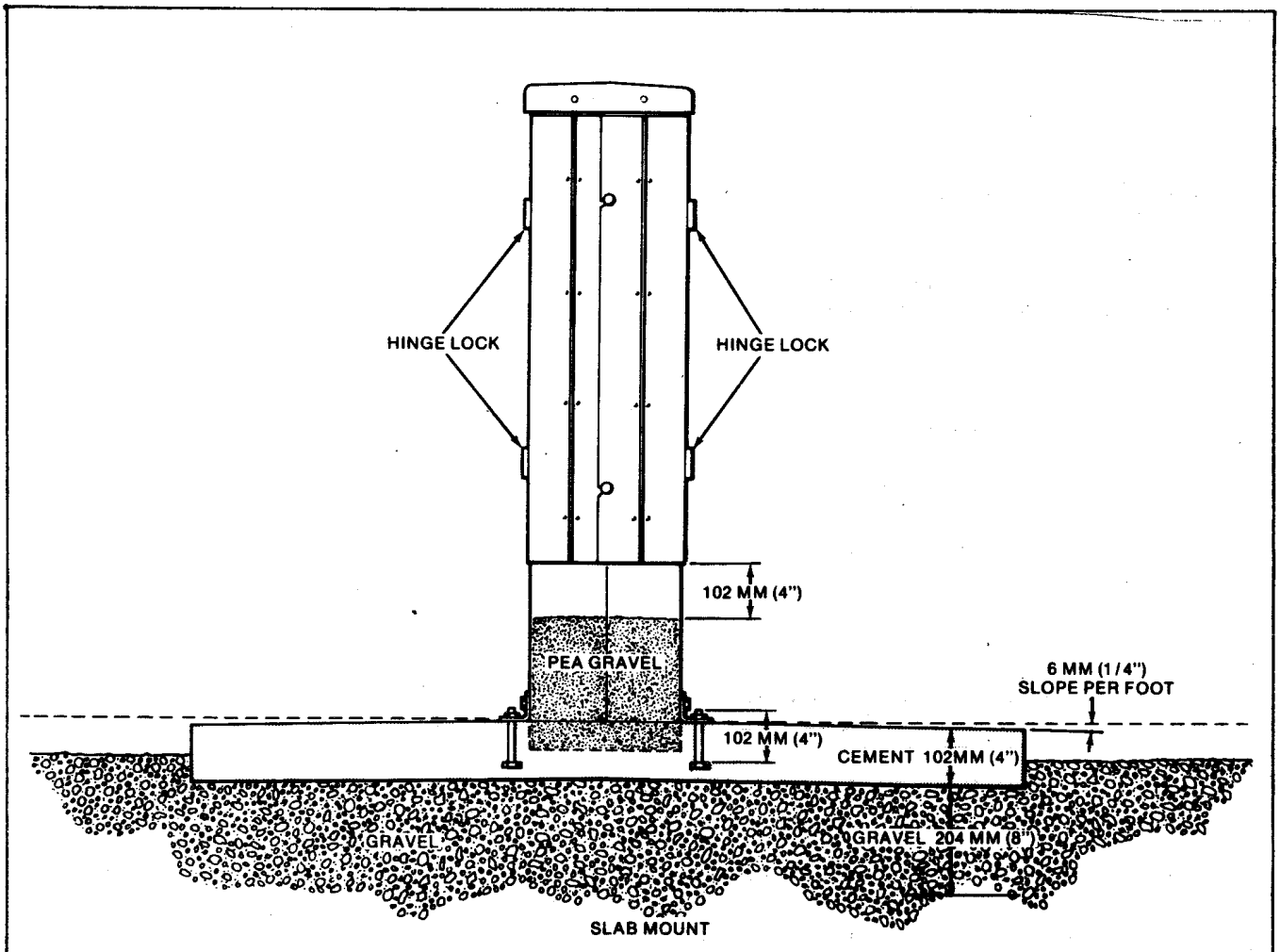
(2) Attach angle irons to cabinet base. Do not tighten bolts completely.

(3) Position cabinet on slab with angle irons fitting over the studs. Secure angle iron to slab with nuts and tighten bolts between angle irons and base.

(4) Fill cabinet base with pea gravel to within 102 mm (4 in.) of the top of the skirt.

(5) Fill space between cabinet base and slab with quick-setting hydraulic cement.

(6) See Fig. 19 for the completed slab mount installation.



4084 & 4086 Slab Mount Installation.

Fig. 19

3.05 The following provides information for pole-mounting the various MS² interfaces.

MS² 4065 (300-Pair) with 4098

(a) Pole-mount conversion kit:

(1) Remove front skirt and hinged panel for easy access.

(2) Mount cabinet in desired position on pole per Fig. 20.

(3) Assemble A1, A2, and A3 to top pole-mount bracket.

(4) Attach top pole-mount bracket assembly to pole with B-1.

(5) Assemble bottom pole-mount bracket to cabinet with C1, C2, and C3.

(6) Hang cabinet assembly on bolt A1, and secure with D1 and D2.

(7) Screw E1 through cabinet and bottom pole-mount bracket and into pole.

(b) Cable adapter — top:

(1) Remove appropriate knockout.

(2) Install cable adapter per Fig. 21.

(3) Insert cable, leaving 1.8 m (6 ft.) stub length.

(4) Tighten adapter nut securely.

(5) Secure adapter on cable with 3 half-lapped layers of vinyl plastic tape.

(6) Secure cable to tab in rear of cabinet top, using standard hose clamp.

(7) Install bond clamp per standard practice.

(c) Bottom plate and cable adapter installation:

(1) Attach bottom plate with nuts and bolts provided as shown in Fig. 21.

(2) Tighten securely.

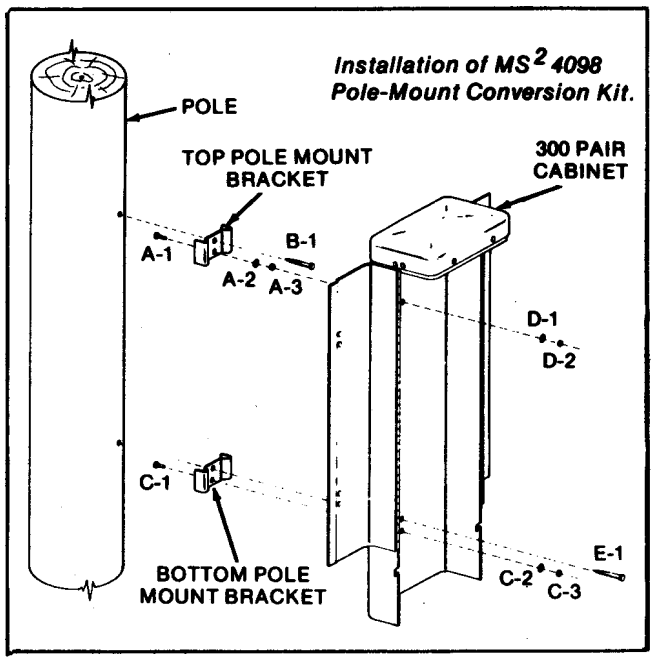


Fig. 20

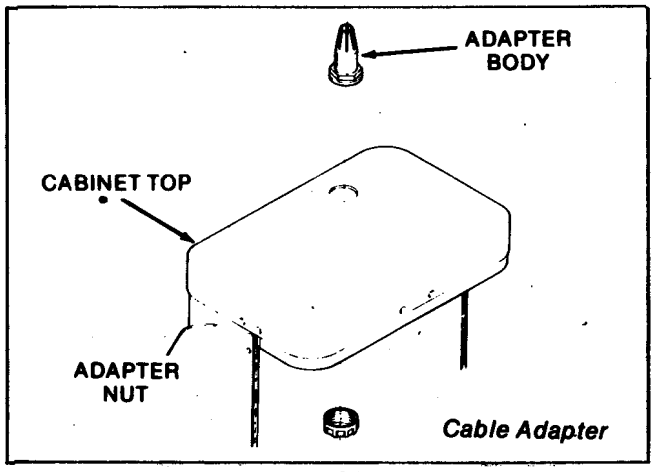


Fig. 21

(3) Install cable adapter per Fig. 22.

(4) Insert cable, leaving 1.8 m (6 ft.) stub length.

(5) Secure adapter on cable with 3 half-lapped layers of vinyl plastic tape.

(6) Bond and secure cables per standard practice.

(7) Attach bonding strap directly to bond bar.

3.06 MS² 4094 (1200-Pair) and 4095 (1800-Pair):

(a) Pole-Mount Installation: Mount cabinet in desired position on pole, using hardware included. Follow standard procedure. (Fig. 23).

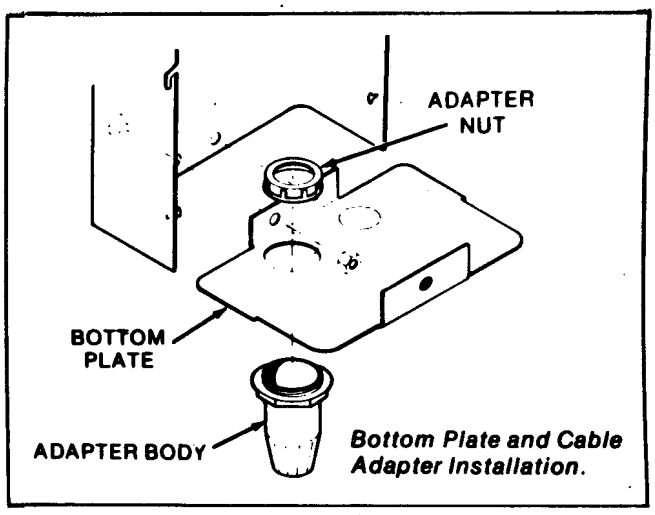
(b) Cable Installation:

(1) Cables should enter cabinet through ports directly in line with appropriate module frame. If only a single cable is to be terminated, place cable in center port to provide the best protection for the cable.

(2) The preferred method is to mount the feeder cable in center module frames and mount distribution cables in outer frames, as shown in Fig. 24.

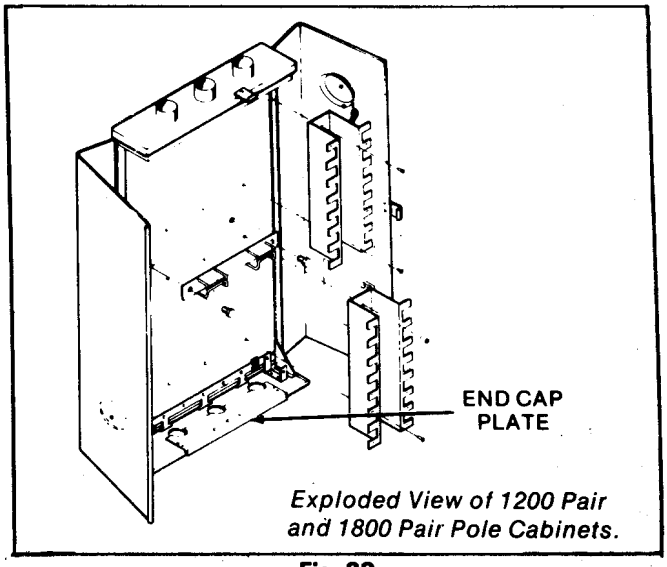
(3) Loop through cables may be installed in the bottom of a cabinet by removing cabinet end cap plates.

(4) The stub length should be a minimum of .6 m (2 ft.) longer than the farthest termination.



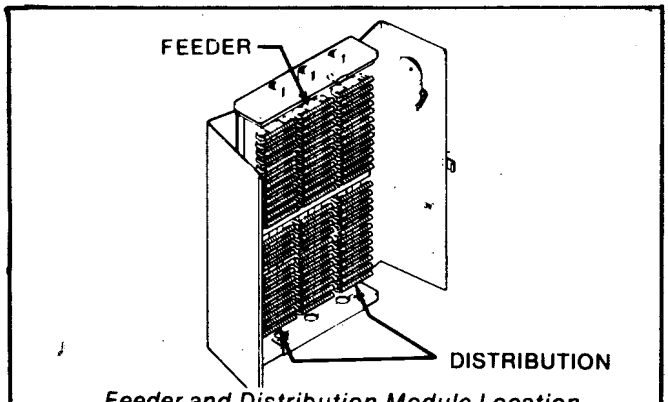
Bottom Plate and Cable Adapter Installation.

Fig. 22



Exploded View of 1200 Pair and 1800 Pair Pole Cabinets.

Fig. 23



Feeder and Distribution Module Location in 4094 and 4095 Pole Cabinets.

Fig. 24

4. CABLE PREPARATION AND TERMINATION

Pole Mounted Interfaces

4.01 Prepare cable in pole-mounted installations as follows:

(a) Remove cable sheath flush with the end of tabs on the bond bar. Do not remove core wrap until bond clamps are placed.

(b) Install the bond clamp per standard procedures to the holes in the bond bar.

(c) Place a sealing clamp around the cable and bond bar tab.

(d) Remove core wraps and place binder group identification ties on the 25-pair groups. Table B provides continuous PIC sheath count and binder group color information. By using the continuous PIC sheath count method, each interface will appear to have only one feeder (IN) cable and one distribution (OUT) cable, no matter how many cables enter the closure.

TABLE B
CONTINUOUS PIC SHEATH COUNT AND BINDER GROUP COLOR

CONTINUOUS PIC SHEATH COUNT	BINDER GROUP COLOR	CONTINUOUS PIC SHEATH COUNT	BINDER GROUP COLOR	CONTINUOUS PIC SHEATH COUNT	BINDER GROUP COLOR
1-25	Bl-W	601-625	Bl-W, R	1201-1225	Bl-W, Bk
26-50	O-W	626-650	O-W, R	1226-1250	O-W, Bk
51-75	G-W	651-675	G-W, R	1251-1275	G-W, Bk
76-100	Br-W	676-700	Br-W, R	1276-1300	Br-W, Bk
101-125	S-W	701-725	S-W, R	1301-1325	S-W, Bk
126-150	Bl-R	726-750	Bl-R, R	1326-1350	Bl-R, Bk
151-175	O-R	751-775	O-R, R	1351-1375	O-R, Bk
176-200	G-R	776-800	G-R, R	1376-1400	G-R, Bk
201-225	Br-R	801-825	Br-R, R	1401-1425	Br-R, Bk
226-250	S-R	826-850	S-R, R	1426-1450	S-R, Bk
251-275	Bl-Bk	851-875	Bl-Bk, R	1451-1475	Bl-Bk, Bk
276-300	O-Bk	876-900	O-Bk, R	1476-1500	O-Bk, Bk
301-325	G-Bk	901-925	G-BK, R	1501-1525	G-Bk, Bk
326-350	Br-Bk	926-950	Br-Bk, R	1526-1550	Br-Bk, Bk
351-375	S-Bk	951-975	S-Bk, R	1551-1575	S-Bk, Bk
376-400	Bl-Y	976-1000	Bl-Y, R	1576-1600	Bl-Y, Bk
401-425	O-Y	1001-1025	O-Y, R	1601-1625	O-Y, Bk
426-450	G-Y	1026-1050	G-Y, R	1626-1650	G-Y, Bk
451-475	Br-Y	1051-1075	Br-Y, R	1651-1675	Br-Y, Bk
476-500	S-Y	1076-1100	S-Y, R	1676-1700	S-Y, Bk
501-525	Bl-V	1101-1125	Bl-V, R	1701-1725	Bl-V, Bk
526-550	O-V	1126-1150	O-V, R	1726-1750	O-V, Bk
551-575	G-V	1151-1175	G-V, R	1751-1775	G-V, Bk
576-600	Br-V	1176-1200	Br-V, R	1776-1800	Br-V, Bk

4.02 The following provides information for routing the cable groups in an aerial cabinet.

(a) **Cables entering from top of cabinet:**

(1) Lay all binder groups to be terminated inside 'U' frame channel.

(2) Module mounts are used in sets of left and right. They are marked with an "R" or an "L" on the tab.

(3) Slide mount onto frame ear until it is seated against vertical frame member. (Fig. 25).

Note: Install mount sets just before completed modules are to be snapped in place for ease in handling.

(4) Temporarily tie a piece of wire or cord across the top module mounts. This will allow the pairs to be firmly seated in the wire channels of the module. This tie may be removed after first module is mounted. (Fig. 26).

(5) The first binder groups will be fed under the tie and over the top of the splicing head.

(b) **Cables entering from bottom of cabinet:** The first binder group will go up the channel of the frame and over the top of the splicing head.

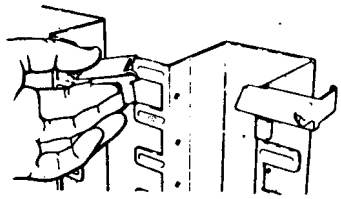
Pedestal Mounted Interfaces

4.03 Prepare cables in closure as follows:

(a) Line up cables with their respective module groups. See Fig. 31, 32 and 33 for the location of the feeder and distribution modules.

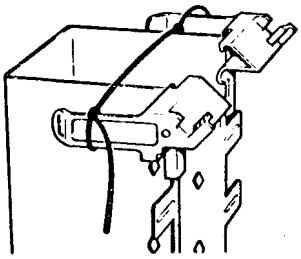
Note: On 4084 and 4086 closures, the bond bar may be moved from the outside bracket to the center bracket if center bond application is desired (Fig. 27).

(b) Use the top of the bond bars as a guide and remove the cable sheaths. Do not remove the core wrapper until the bond clamps are installed.



Slide Mounts on Frame Ears.

Fig. 25



Tie Cord Across Top Module Mounts.

Fig. 26

(c) Remove the core wrappers and bond the cable to the bond bar, using standard procedures.

Note: Air core cables must have moisture seals. If the injection method is followed, a standard bond clamp may be used to attach to the bond bar. If a mold is used for encapsulation, use a floating bond (D bond strap). A separate connection to the ground bar should be made for each cable sheath so that cables can be isolated for cable location and other maintenance work.

(d) If grounding of the cabinet is necessary, follow standard procedures.

(e) Plug all ducts and fill the closure base with gravel.

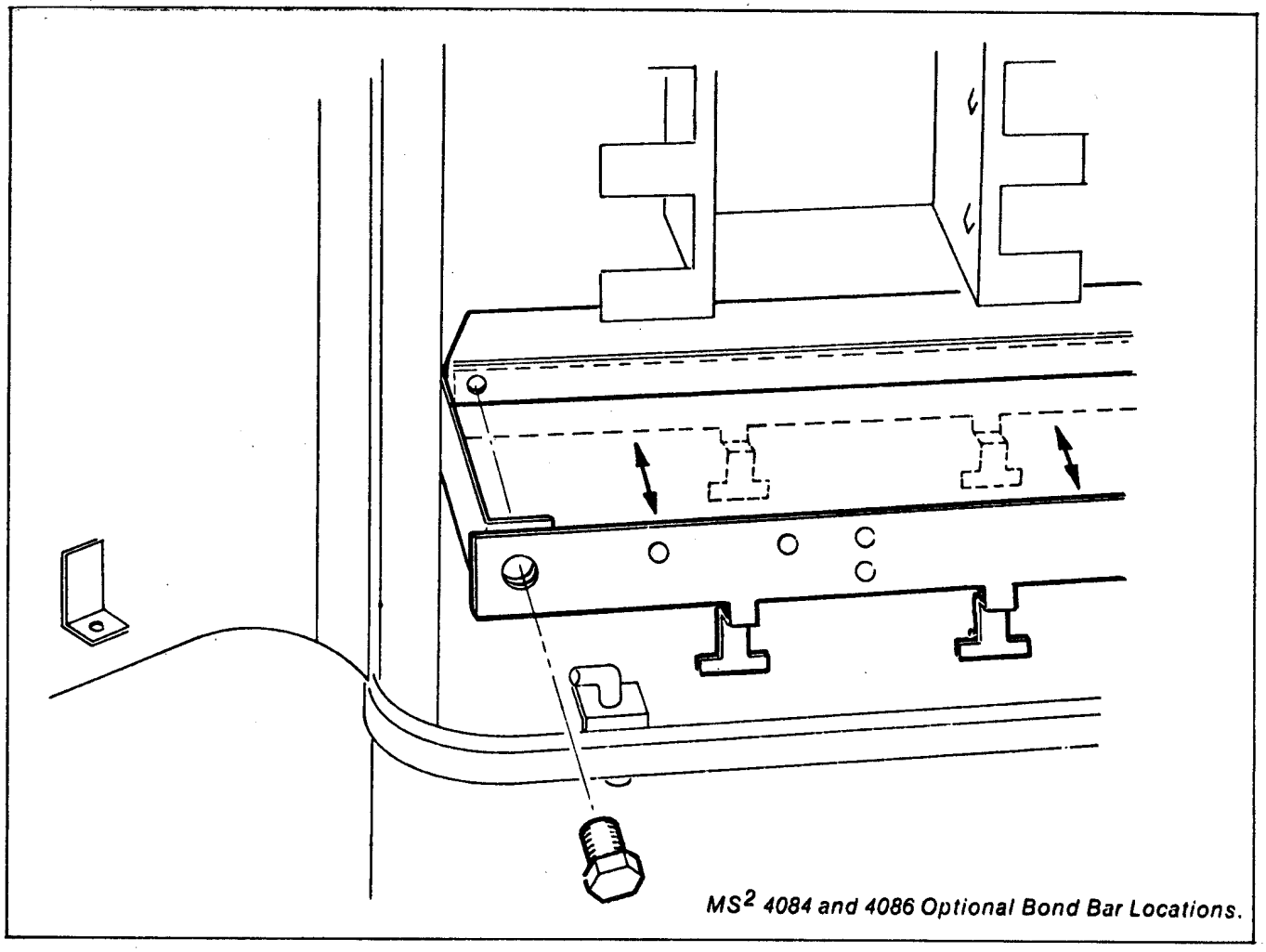
4.04 Assemble the module frame as follows:

(a) Lay the cable groups down over the skirt of the cabinet and place binder group identification ties on the 25-pair groups. See Table B for the continuous PIC sheath count and binder group color identification.

(b) Remove the four frame bolts from the closure.

(c) Place the closure on frame assembly.

(d) Replace and tighten bolts securely.



MS² 4084 and 4086 Optional Bond Bar Locations.

Fig. 27

Cable Routing in Pedestals

4.05 The following describes the method of routing the cable in the various types of pedestal interfaces:

(a) **MS² 4065 (300-pair) cabinet:**

(1) Cable must enter 'U' framed channel through hinged panel.

(2) Form a .6 m (2 ft.) gooseneck behind panel to allow for slack. (Fig. 28).

(3) Binder groups that will be open ahead (dead in sheath) should be removed, taped, or wrapped and secured to rear of cabinet.

(4) Cable ties are provided to secure cable to backboard.

(b) **MS² 4080 (600-pair) cabinet, MS² 4082 (900-pair) cabinet, MS² 4084 (1200/1800-pair) cabinet, MS² 4086 (1800/2700-pair) cabinet:**

(1) Allow 76 - 102 mm (3" - 4") of cable slack by forming a dog-leg and temporarily tie cable in place. This prevents stress damage to modules during normal settling and shifting of ground. (Fig. 29).

(2) Remove tie after completion of terminating.

(3) Binder groups that will be open ahead (dead in sheath) should be removed, taped, or wrapped and moved out of the way.

(c) **Cable terminated in cabinet:**

(1) If feeder or distribution pair count exceeds the capacity of the front side of the frame, the balance should be terminated on the rear frame.

(2) Bond and secure cables to bond bar per standard procedure.

(3) Repeat until all cables are bonded and secured.

(d) **Cable looped through cabinet:**

(1) Identify binder groups that will terminated in this cabinet.

(2) Lay express binder groups in unused frame (or behind frame on MS² 4065, 4080, and 4082 cabinets).

(3) If future additions are to be made, store involved express binder groups in frame where they will eventually be used. Wrap express binder groups if required.

(4) Bond and secure cables to bond bar per standard procedure. (Fig. 30).

(5) Repeat until all cables are bonded and secured.

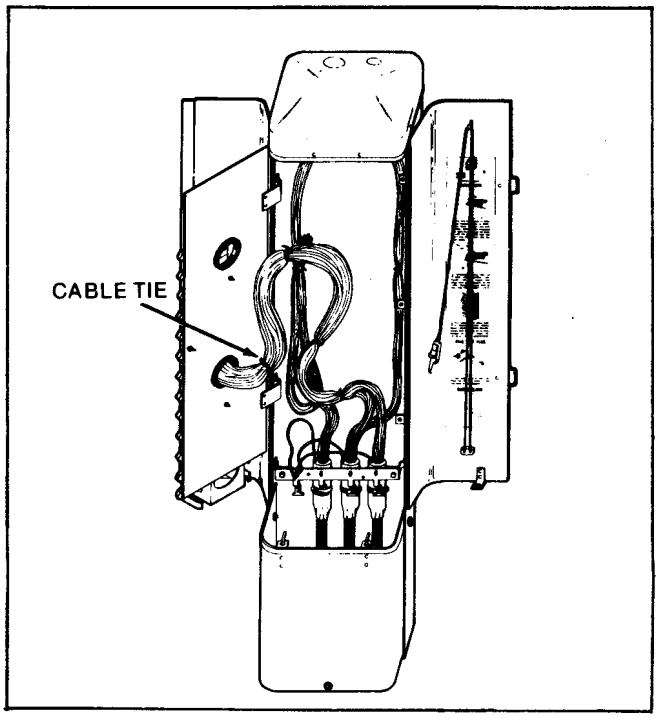


Fig. 28

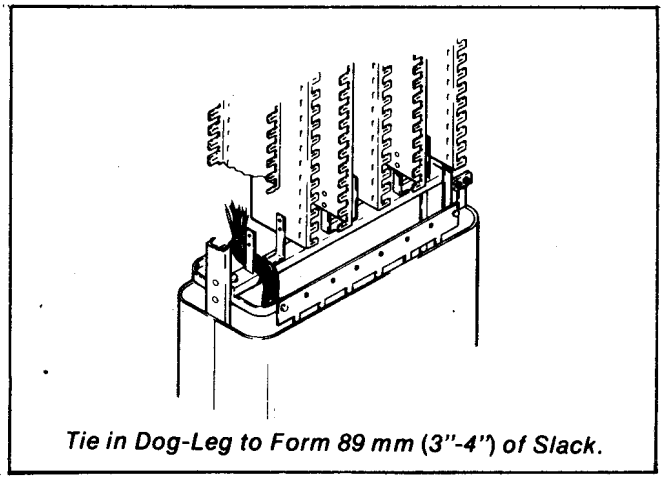


Fig. 29

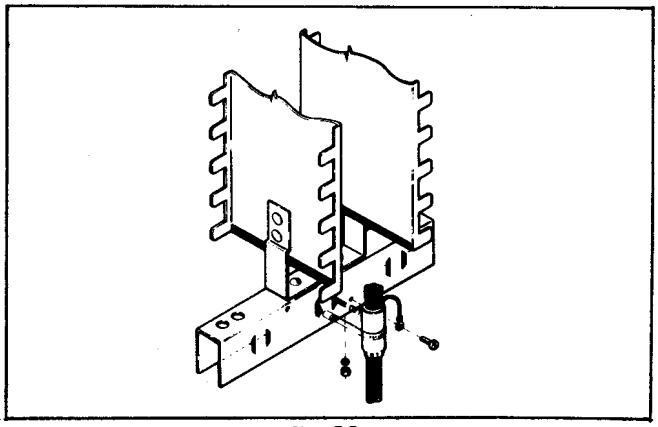


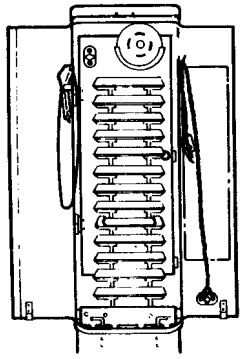
Fig. 30

Location of Feeder and Distribution Modules

4.06 The following describes the location of the feeder and distribution modules in the various pedestal and aerial interfaces:

(a) MS² pedestal cabinets — Fig. 31, 32, and 33 illustrate the recommended location of feeder (green cover) and distribution (blue cover) modules. Cable handling will be simplest with these layouts.

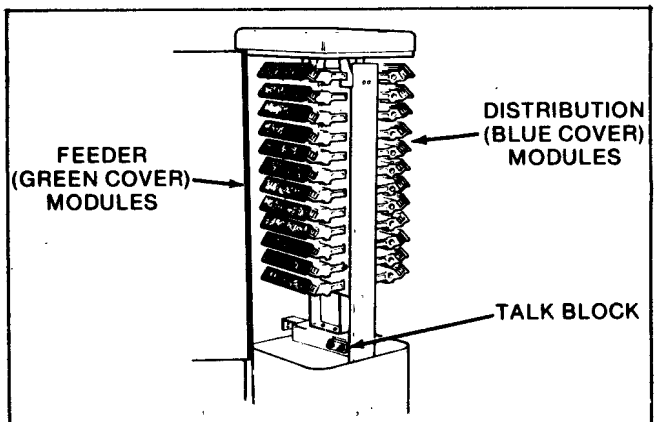
Note: Stencil the pairs in the 4084 interface using the binding post method (1-1800), even when all pairs are not connected initially. Start count at upper left module on the street side of the closure. Assignment procedures dictate that the 4086 interface be stenciled 1-900 IN and 1-1800 OUT.



Feeder and Distribution Module Location in 4065 Pedestal Cabinet

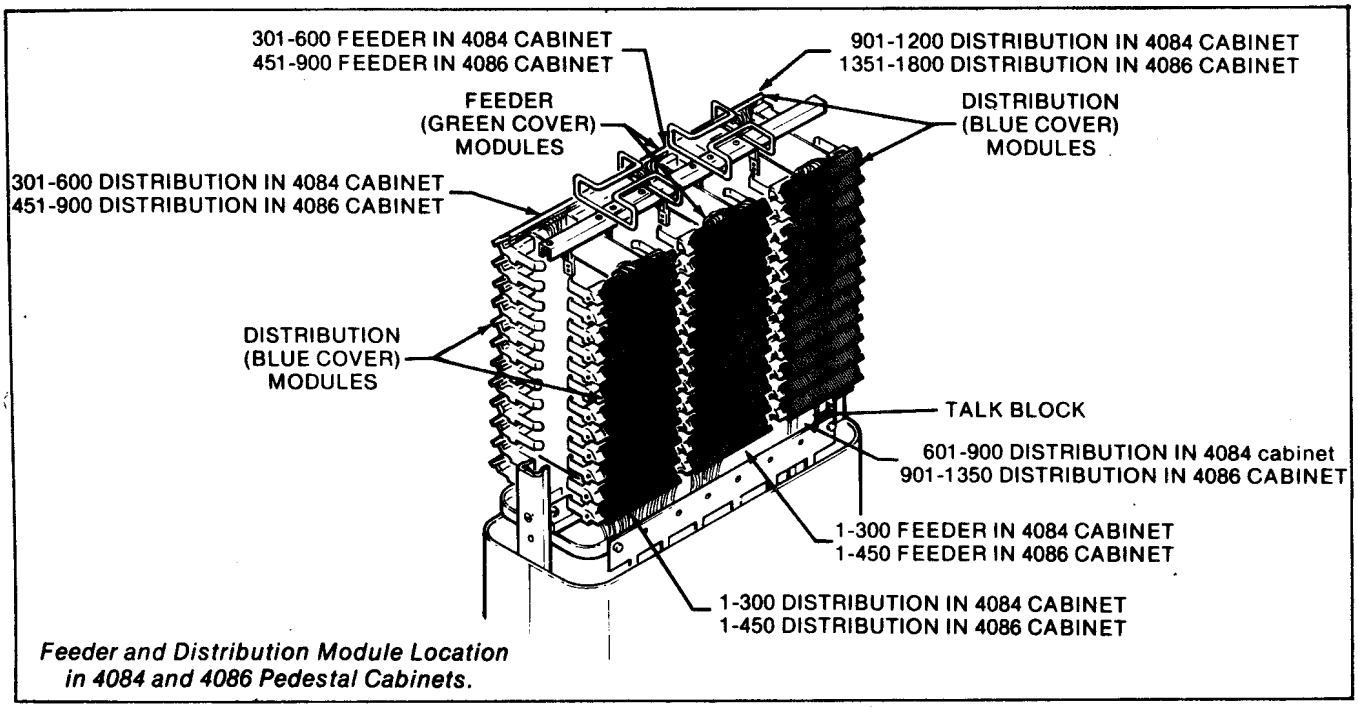
NOTE: Feeder Module Locations are Interchangeable From Top to Bottom.

Fig. 31



Feeder and Distribution Module Location in 4080 and 4082 Pedestal Cabinets

Fig. 32



Feeder and Distribution Module Location in 4084 and 4086 Pedestal Cabinets.

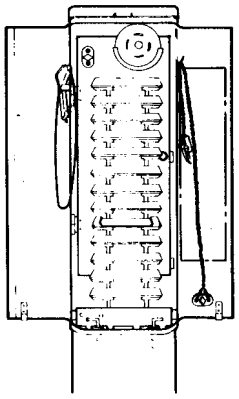
Fig. 33

(b) **MS² pole-mount cabinets:**

(1) Feeder and distribution module location in 4098 pole-mount cabinet. (Fig. 34).

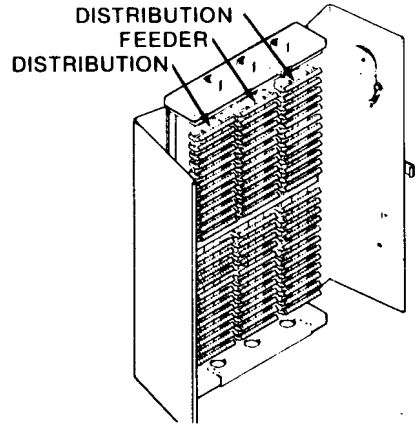
Note: Feeder module locations are interchangeable from top to bottom.

(2) Feeder and distribution module location in 4094 and 4095 pole cabinets. (Fig. 35).



Feeder and Distribution Module Location in 4098 Pole-Mount Cabinet

Fig. 34



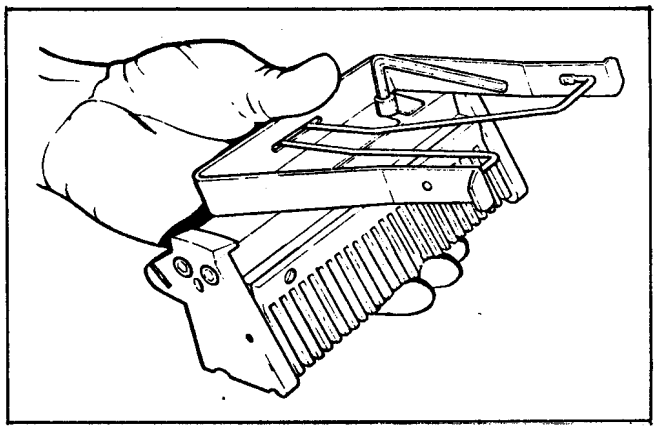
Feeder and Distribution Module Location in 4094 and 4095 Pole Cabinets

Fig. 35

Terminating Procedure

4.07 The pairs will be terminated on the modules using the splicing head and crimping device from the 3M/MS² splicing rig. Always start at the top of a module frame and work down. The holes in the frame for the splicing head are just below the tabs for the module mounts. Once a module is in place, the adapter cannot be inserted to splice a higher module.

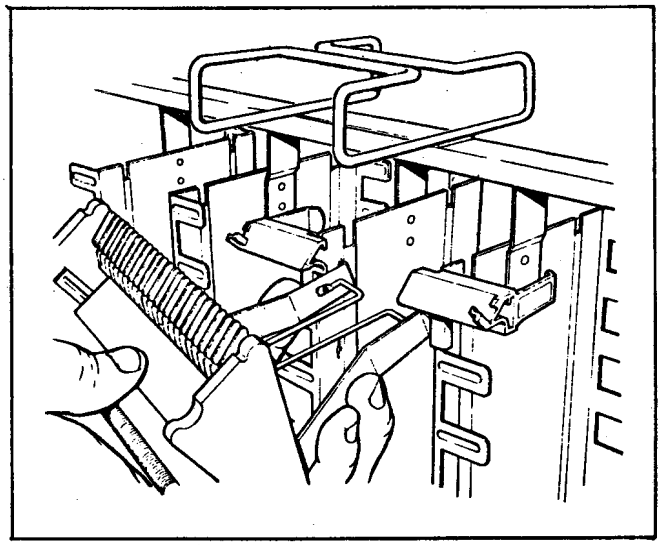
4.08 Remove the pedestal from the splicing head and attach the splicing head frame adapter (Fig. 36). Use the 3/16" Allen wrench furnished with the MS² splicing rig.



Splicing Head (With Adapter)

Fig. 36

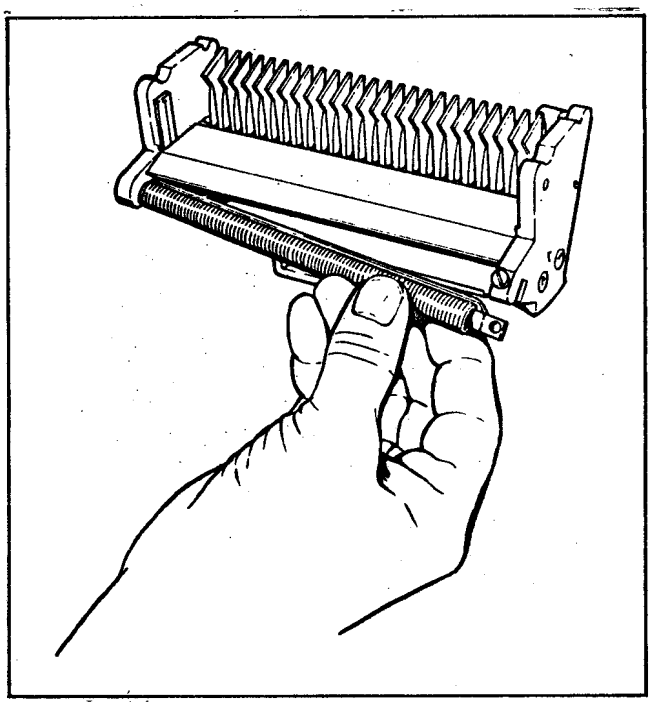
4.09 Mount the splicing head in the top hole of the module frame (Fig. 37) by squeezing the legs of the adapter together and snapping the end tab into the diamond shaped cutouts in the module frame.



Splicing Head Mounted on the Module Frame

Fig. 37

4.10 Check that the wire retaining spring on the splicing head is set to the proper gauge (Fig. 38). To change the spring, loosen the wire retainer screw and turn the spring assembly to the proper size as shown on the spring face plate.



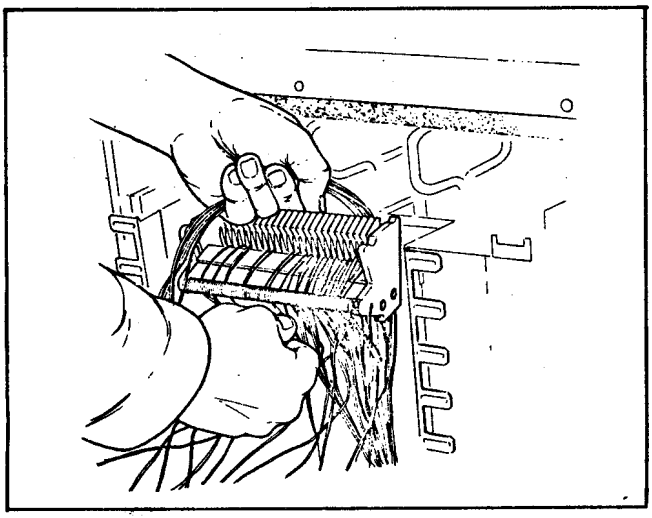
Adjusting the Wire Retainer Spring
Fig. 38

4.11 Select either the 4010E feeder (green) module or the 4011E distribution (blue) module. Place the module base into the leaf spring tracks of the splicing head so the alignment holes are towards the terminal and the cutoff blades are towards you.

4.12 Thread the first binder group up the wire channel of the module frame and over the top of the splicing head.

Note: The pair splitters on the splicing head are color coded for speed and accuracy. Pairs can be laid into their proper position as they are identified.

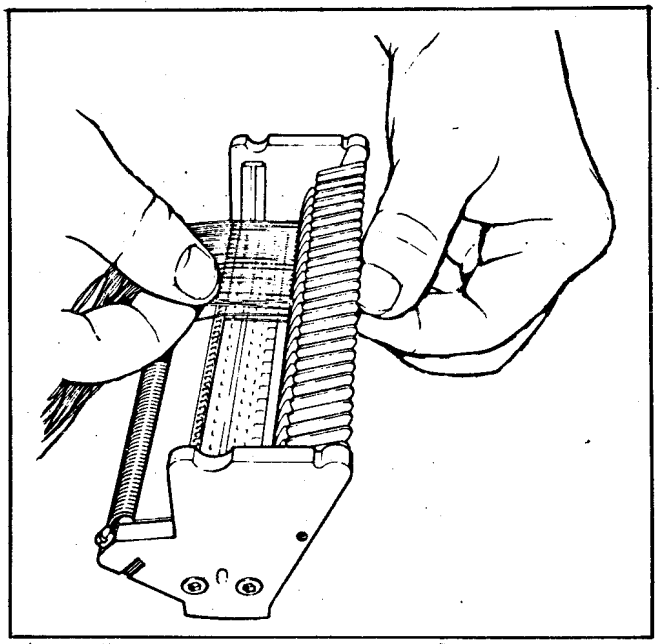
4.13 Use the thumb and forefinger of each hand to guide the pairs over the pair splitter (Fig. 39), using the same technique used in modular splicing.



Laying Wires Into the Base
Fig. 39

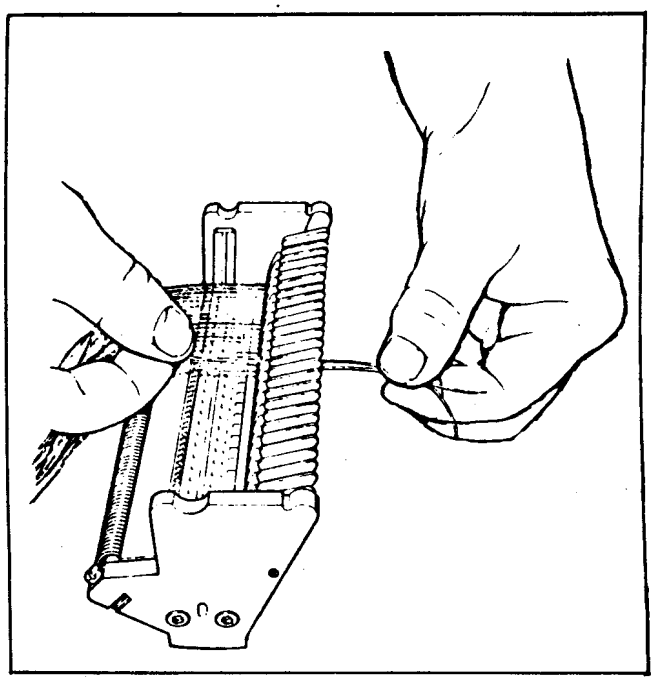
4.14 When guiding the pairs over the pair splitter, keep the guide thumb close to the base (Fig. 40).

4.15 Allow about 1" of slack behind the head. Take up the slack by pulling the wires firmly into the wire channels on the base and into the wire retaining spring.

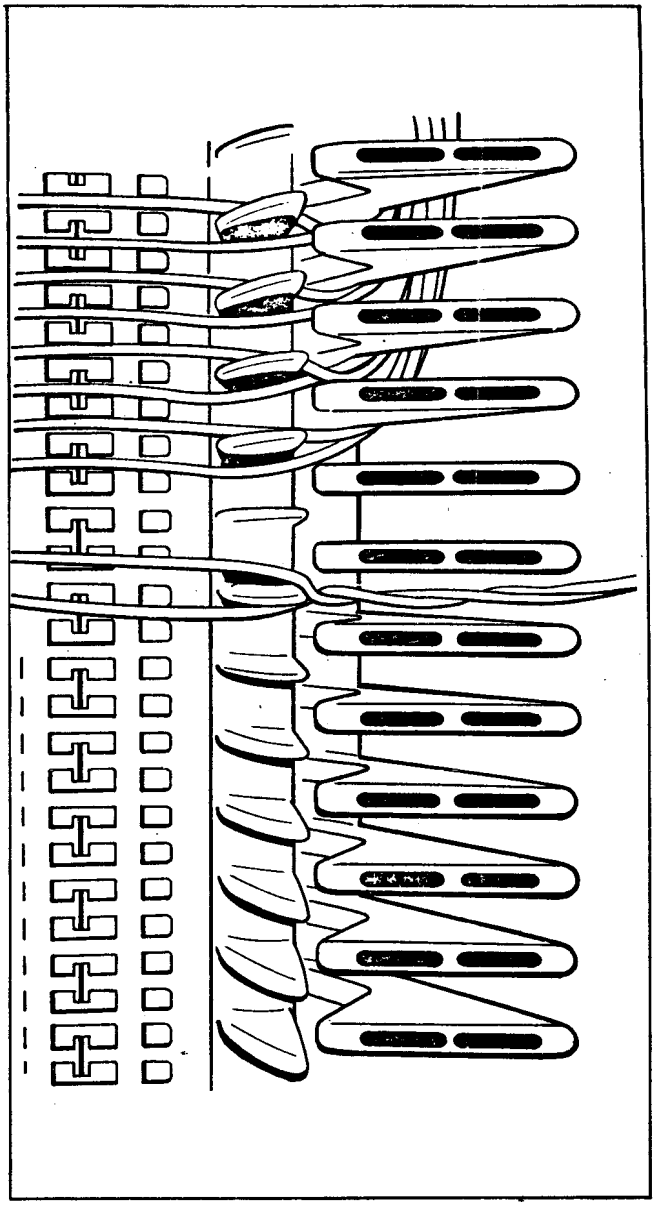


Guide Thumb Close to the Base
Fig. 40

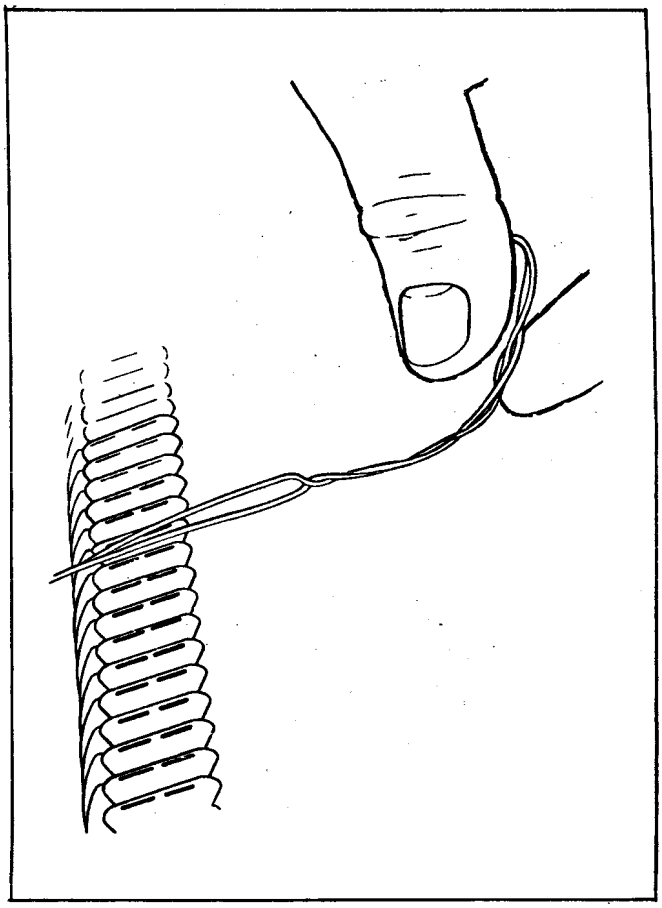
4.16 Too much slack or holding the guide thumb too far from the splicing head (Fig. 41) can cause the pair to knot (Fig. 42) as the pair is pulled over the splitter. Tugging on the pair can cause insulation damage (Fig. 43).



Thumb Too Far Away
Fig. 41



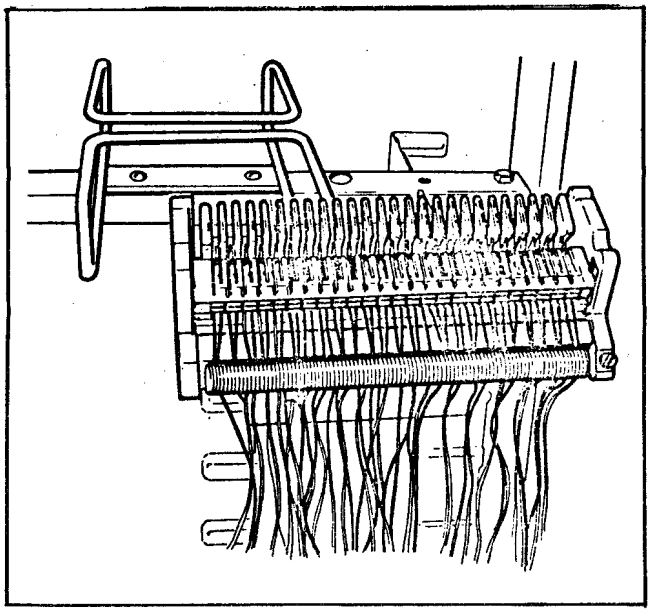
Knot At The Pair Splitter
Fig. 42



Insulation Damage Caused by Knot
Fig. 43

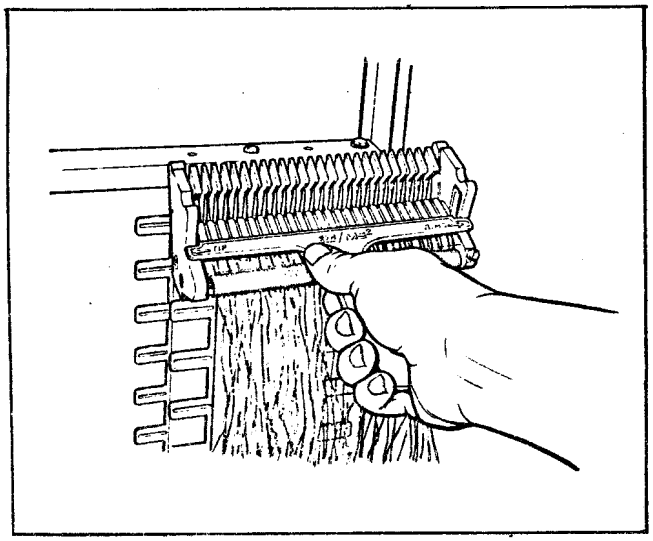
4.17 If a pair is reversed, keep the guide thumb on the pair. Switch the lay of the wires by lifting the pair to clear the splitters and reversing the lay with the opposite hand.

4.18 After 25 pair are in place, check to see that all wires are completely in each channel by running the thumb or finger over the connector (Fig. 44).



Module Ready for Crimping
Fig. 44

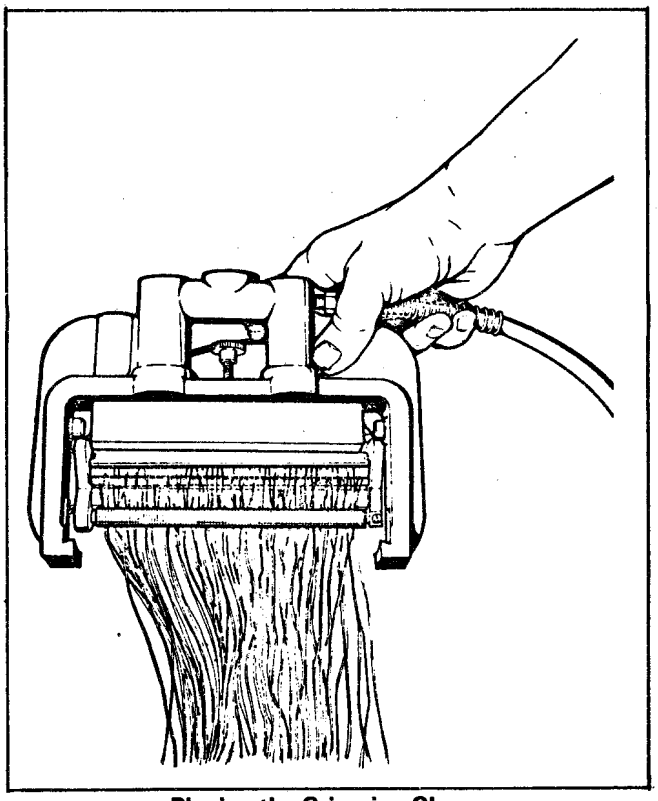
4.19 Use the check comb from the 3M/MS² splicing rig (Fig. 45) to check for proper wiring order. You should see no ring wires in one position and no tip wires in the other position.



Using the Check Comb
Fig. 45

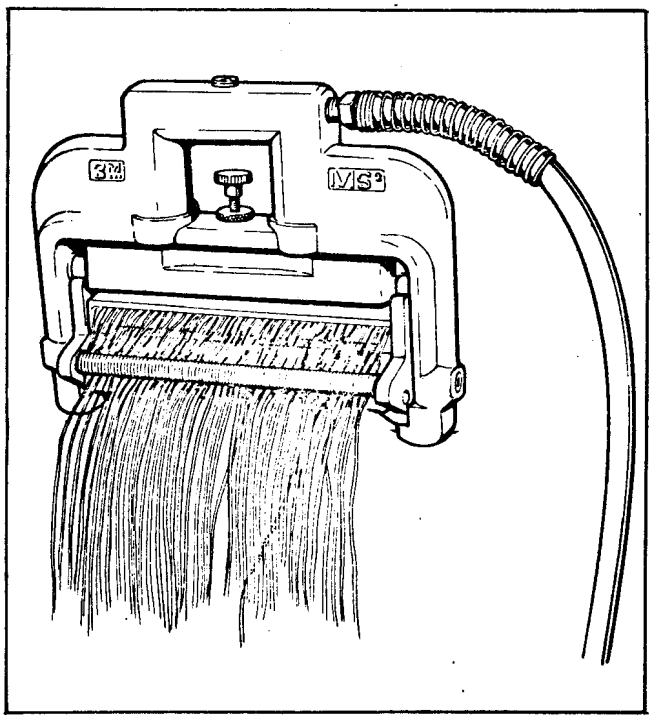
4.20 Place a body and a cover into the leaf springs of the splicing head.

4.21 Put the crimping clamp on the splicing head (Fig. 46). The base can be either towards the left or the right. Pins on the inside of the clamp rest in pin pockets on the splicing head as the clamp is placed on the head at an angle.



Placing the Crimping Clamp
On the Splicing Head At An Angle
Fig. 46

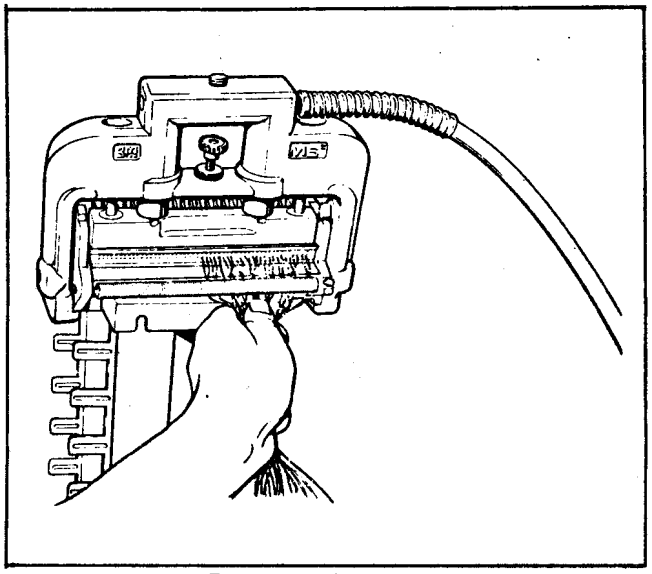
4.22 Rotate the crimping clamp (Fig. 47) until the detents lock the clamp in an upright position. If the detents do not lock or prevent rotation, they can be adjusted with a screwdriver.



Rotating the Clamp To An Upright Position
Fig. 47

4.23 The clamp is designed to crimp the module to the proper height. The air/hydraulic crimping unit has a by-pass so that it idles when the crimp is complete. The hand/hydraulic crimping unit has a by-pass, but it is not as noticeable as with the air pump. To use the air/hydraulic unit, press the forward end of the pedal until the unit by-passes, then return the pedal to neutral. To use the hand/hydraulic unit, close the release valve on the side of the pump and work the hand pump about 5 strokes after the module appears closed. Both pumps must be properly positioned to keep air out of the hydraulic lines. Keep the output end of the air/hydraulic unit level with or higher than the rear. Keep the output end of the hand/hydraulic unit level with or lower than the rear.

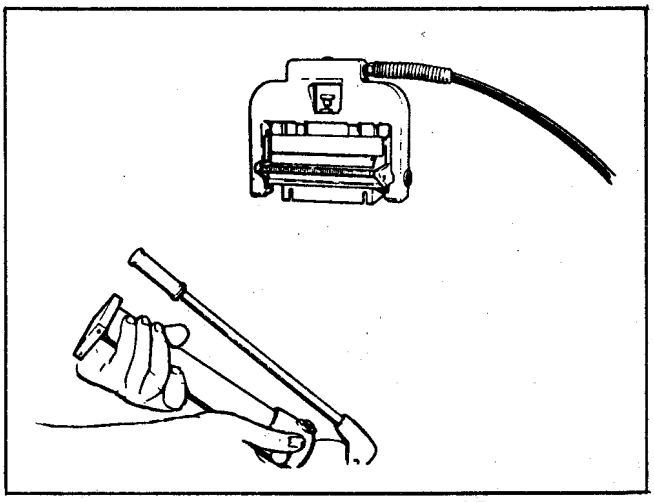
4.24 Leave the clamp in the closed position. The wires should be cut. Grasp 1/4 to 1/3 of the wires (Fig. 48) and lift them out of the wire retaining spring. Gently tear them to the left or right; do not jerk them.



Removing Cut Wires
Fig. 48

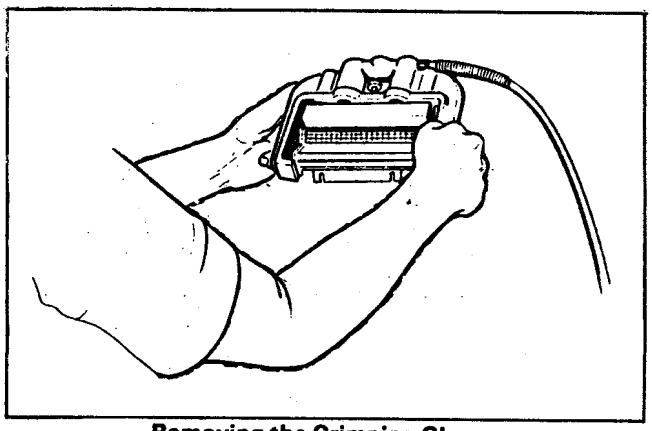
4.25 If a wire or wires are not cut, it may be due to more than one wire in a wire channel or a wire laying across a channel divider. To correct this situation:

(a) Release the pressure on the crimping clamp. To release the pressure on the air/hydraulic unit, push back on the pedal. To release the pressure on the hand/hydraulic unit, open the release valve on the side of the pump (Fig. 49).



Releasing Pressure on the Hand Pump
Fig. 49

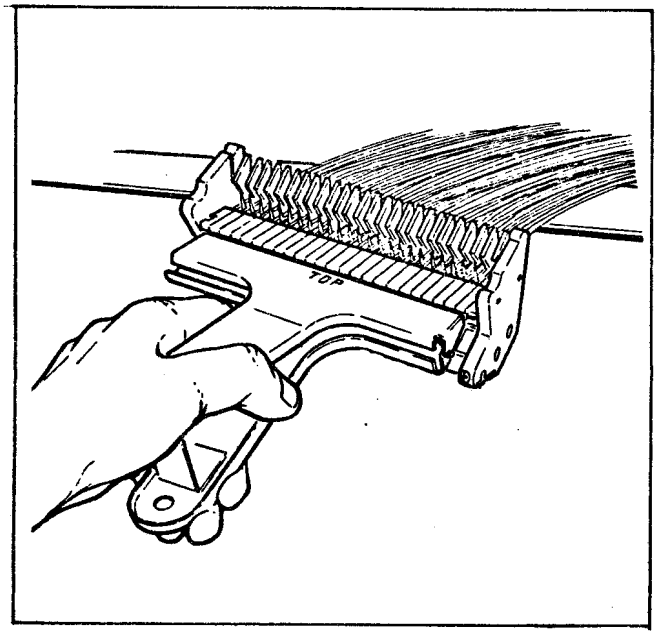
(b) Remove the crimping clamp. Rotate the clamp to release the detents (Fig. 50).



Removing the Crimping Clamp
Fig. 50

(c) Separate the base and body of the module. To separate the base from the body, use the No. 4053 cover removal tool from the 3M/MS² splicing rig (Fig. 51). To use the tool, insert the tips into the base wire channels and squeeze the handles to pop the body and cover free.

Note: The base and body will separate with considerable force. Restrain the body and cover with one hand.



No. 4053 Cover Removal Tool
Fig. 51

(d) Carefully place the the wires in the correct channels. This can be done with the fingers or long-nose pliers.

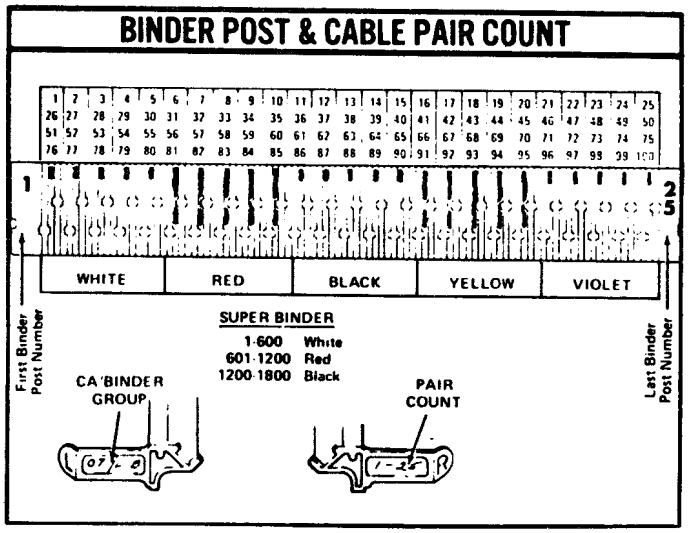
(e) Replace the body and cover and recrimp the module.

4.26 Remove the crimping clamp (4.25 b). Do not remove the module from the splicing head. Move the splicing head and adapter to the next lower position.

4.27 Installing the module mounts and the module on the mounts:

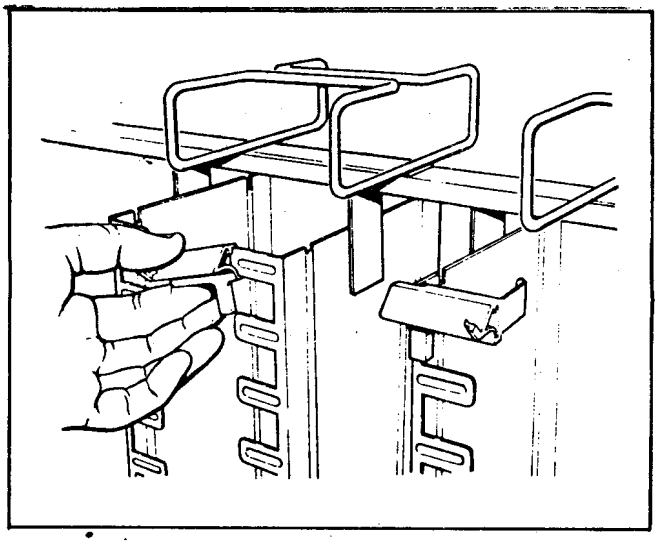
(a) Module mounts are used in sets of right and left. They are marked with an R or L on the ears.

(b) Identify the cable, binder group, and cable count on the mounts before installing them (Fig. 52). Use a permanent medium fine line marking pen to show the cable number and binder group on the left mount and the cable count on the right mount.



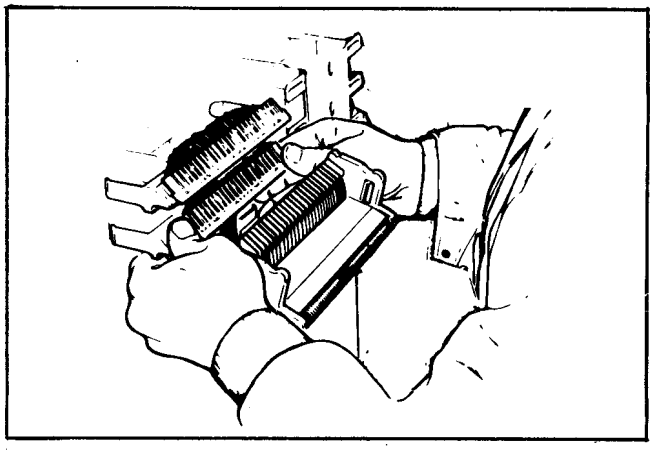
Cover and Mount Set Marking
Fig. 52

(c) Slide the mounts onto the frame ears (Fig. 53) until they are seated against the vertical frame members.



Installing the Mount Set
Fig. 53

(d) Remove the module from the splicing head and snap it onto the mount set (Fig. 54). Support the frame fingers as the module is snapped into place.



Snapping the Module Onto the Mounts
Fig. 54

(e) There is a matte surface on both ends of the module cover (Fig. 52). Using a permanent-type medium fine line marking pen or self-adhesive numbers. Mark the beginning binding post number on the left surface and the end binding post number on the right surface.

4.28 Repeat this procedure (Par. 4.12 through 4.27) working down the frame, splicing modules and snapping them into place. The bottom two positions on each frame require a slightly different procedure. The splicing head must use the same set of mount holes for both of the last modules. When the next to the last module has been spliced, remove the head. Lift this module off and snap into place. Put the head back into the same (last) position to splice the last module. Remove head and module and snap into place. (Push any excess wire slack up and behind the module.)

4.29 When all feeder and distribution pairs have been terminated on modules, remove the dog-leg ties from the cable and mounting frame to allow the cabinet to float without disturbing the wire connections.

Cable Separator Installation

4.30 MS² 4061 cable separators are used between modules and where frames are "open" to close off feeder or distribution binder groups in the 3M MS² cross-connect pedestals.

4.31 The cable separators are supplied in sheets of four. To remove a single separator from the sheet, snip along the notched section as shown in Fig. 55.

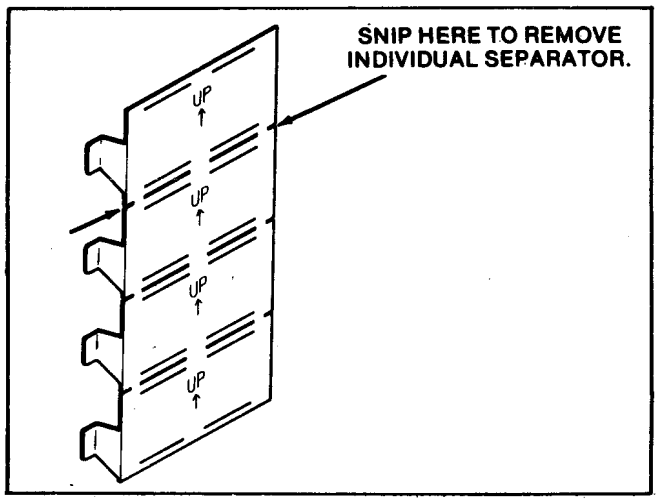


Fig. 55

4.32 Install separators between modules as follows:

(a) The cable separator is installed after a module has been terminated and put on its mounts and before the next binder group termination starts.

(b) When module is completed, remove splicing head frame adapter and train binder group wires toward center of frame and slightly downward. Attach mount set (4060) and snap terminated module onto mounts.

(c) Turn separator so left edge is well inside frame, then insert tab in right-hand diamond-shaped hole directly below module (Fig. 56). Pull separator forward until left tab snaps into hole in frame.

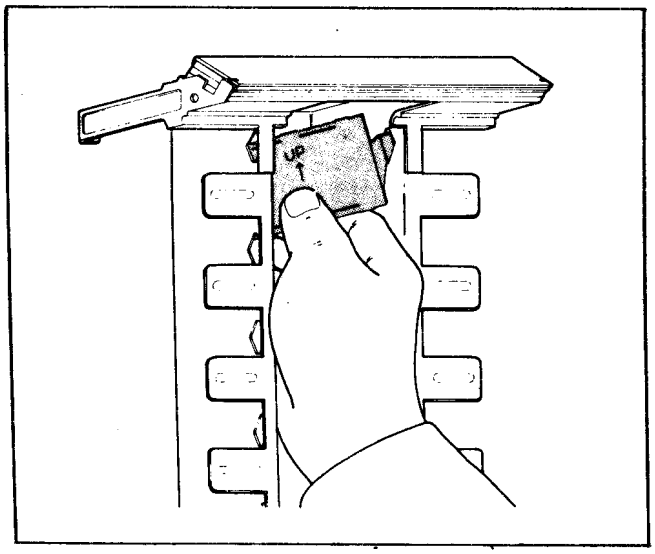


Fig. 56

4.33 Install separators between frame openings as follows:

(a) For installation in frame openings, the separators need not be individually cut apart but may be placed into the frame up to four at a time (Fig. 57).

(b) Insert tabs on right end of separators into appropriate diamond-shaped holes in frame. Bow separators outward by pushing on left end and snap tabs into holes on left side of frame.

Note: In frames having only one or two modules at the top, it may be necessary to place an appropriate tie across the center of the frame after the separators have been installed to make up for outward bowing of the frame.

4.34 Install a spool of F cross-connect wire (Wire, Cross-Connect, F, 1 Pr.) on the jumper wire rack.

4.35 Replace the top and cover on the 4080 or 4082 cabinet. Replace the doors on the 4084 or 4086 cabinet.

5. CROSS-CONNECT WIRING

5.01 In the top of each cabinet there is a jumper wire spool spindle. The spindle must be kept supplied with a spool of type F cross-connect wire, 24 AWG. **This is the only type of wire to be used for cross connecting.**

5.02 To change wire spools in the 4080 and 4082 cabinets, remove the top and cover. To change wire spools in the 4084 and 4086 cabinets, open all the doors and remove the four bolts that hold the top in place.

5.03 Each cabinet comes equipped with a No. 4055 impact insertion tool and a No. 4049 pair test plug. These tools must remain in the terminal for use by the installation and repair forces.

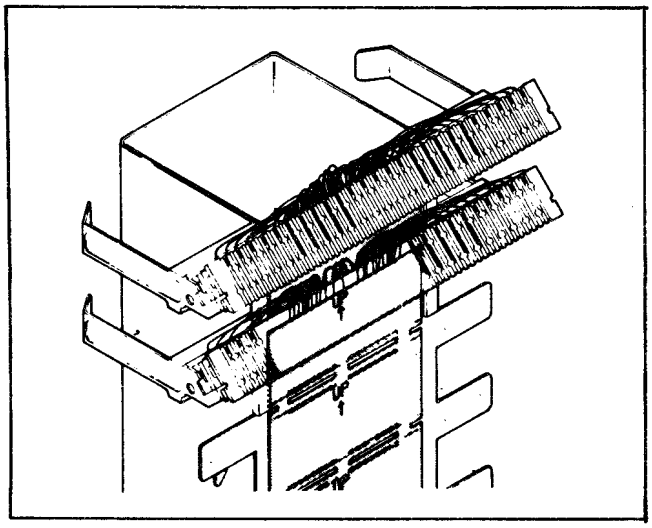
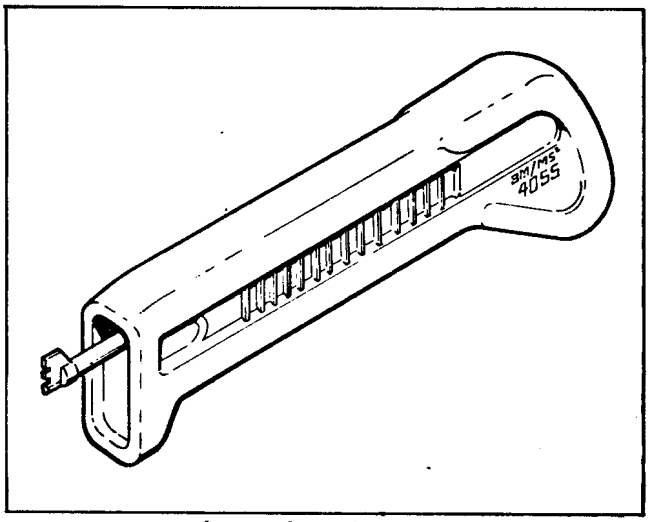


Fig. 57

5.04 The No. 4055 impact insertion tool (Fig. 58) is used to terminate jumper wires on the modules. The tool is spring loaded and requires manual pushing until the tool snaps to automatically terminate and cut off the end of the jumper wire. The tool is designed so that it will not impact unless the face of the tool is flat or nearly flat against the cover of the module when the spring is compressed. This feature insures that the jumper wire is fully terminated and cut off without repeated effort.



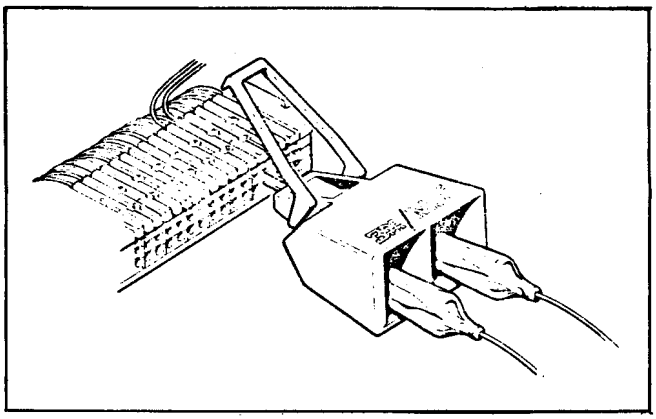
Impact Insertion Tool
Fig. 58

5.05 The No. 4049 pair test plug (Fig. 59) is used for talking over or testing on a pair. To use the pair test plug:

(a) Insert the pins of the test plug into the test ports in the body of the module.

(b) Swing the clip over the module cover to lock it in place.

(c) Attach alligator clips from the test set to the recessed metal tabs in the back of the plug.



Pair Test Plug
Fig. 59

5.06 A jumper wire channel on each side of a module bank (Fig. 62 and 63) is formed by the module mount extensions and the outside of the module bank frame.

5.07 If a jumper wire is to be terminated on the left half of a module (1-12), the jumper wire should be run down the left channel. If a jumper wire is to be terminated on the right half of a module (13-25), the jumper should be run down the right channel.

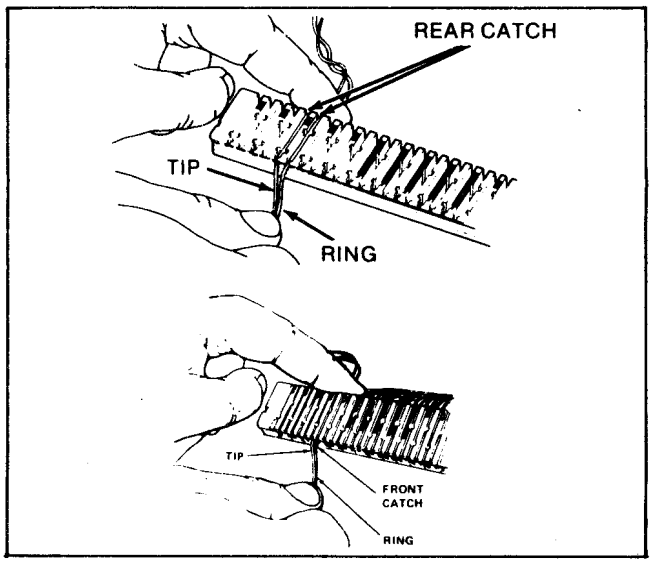
5.08 To run a jumper wire:

(a) Determine the location of the pairs to be connected.

(b) Pull the end of the jumper wire down the appropriate wire channel to the top of the cross-connect module.

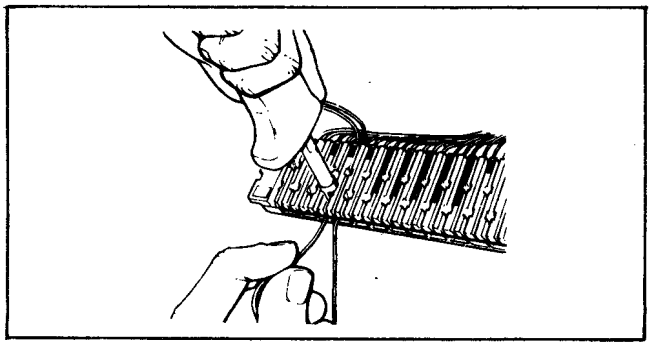
(c) Bring the end of the wire over the top of the module and train it across the top of the module to the termination.

(d) Split the pair over the black divider with the TIP left and the RING right (Fig. 60). Snap the wires into the front and rear catches of the cover.



Jumper Wire Snapped Into Wire Channels
Fig. 60

(e) Punch the connection with the impact tool (Fig. 61). Remove the excess wire before lifting the tool away.



Punching the Connection
Fig. 61

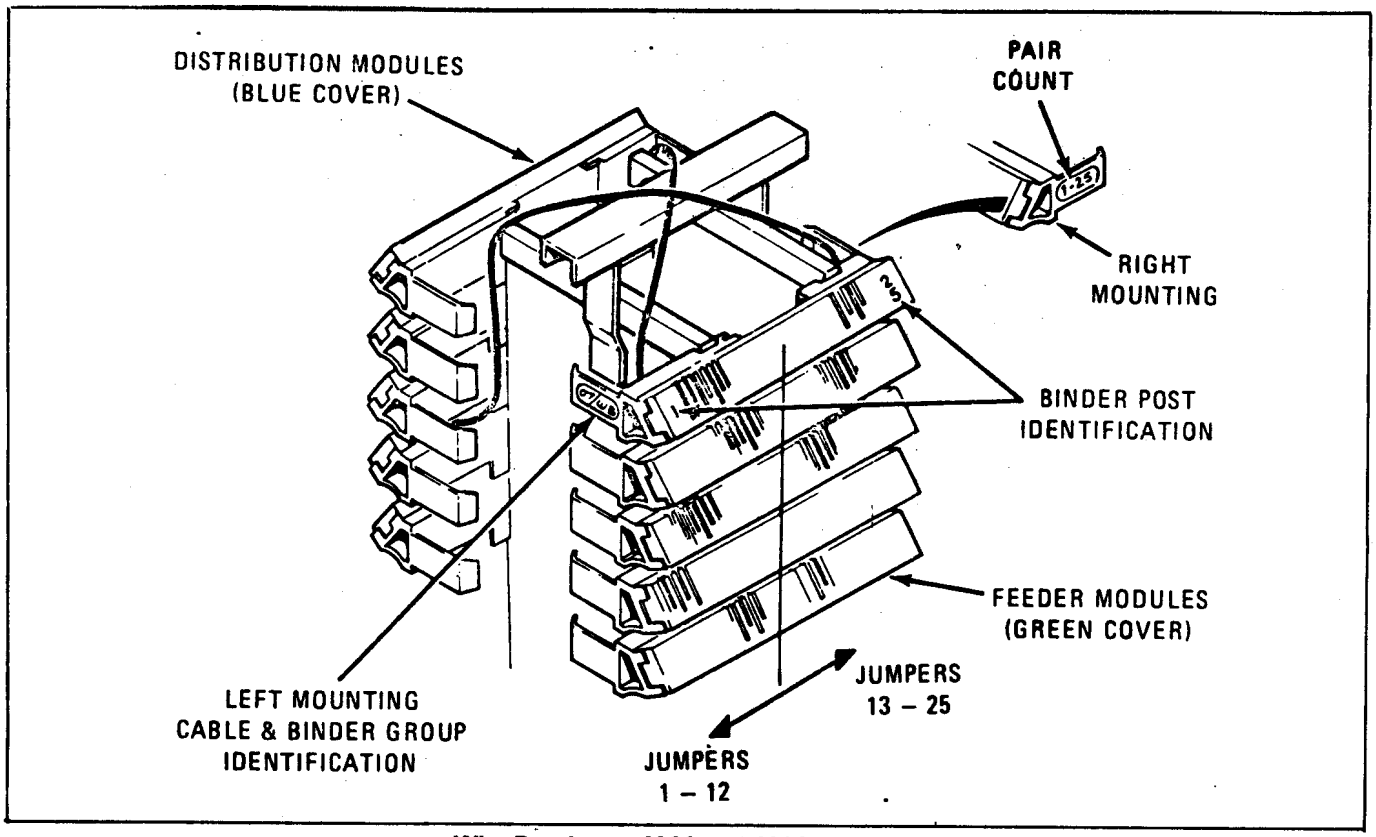
(f) In 4080 and 4082 cabinets, route the jumper wire over the top rail as shown in Fig. 62.

(g) In 4084 and 4086 cabinets, route the jumper through the rings on top of module frame as shown in Fig. 63.

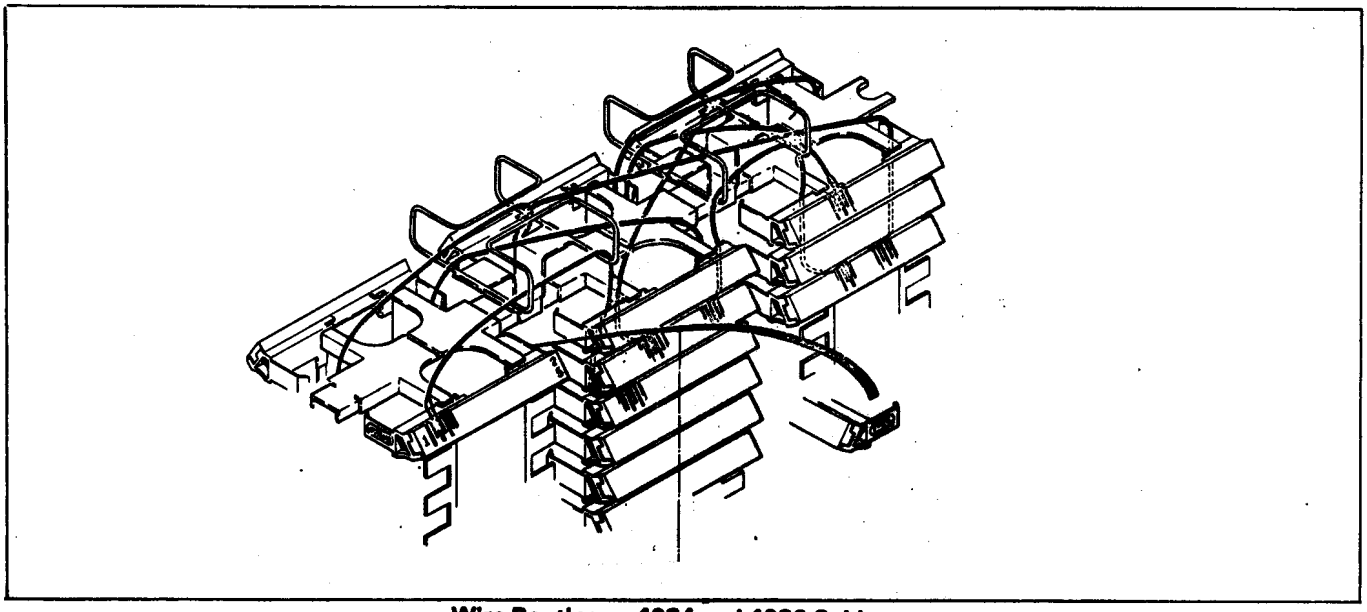
(h) Cut the jumper wire long enough to reach the other termination and allow 2" to 3" of slack in the jumper.

(i) Terminate the jumper as in (d) and (e) above. Store the slack behind the module.

5.09 If it is necessary to rearrange or change a jumper, the jumper wire may be removed by gently pulling straight out. When reterminating the jumper wire, use some of the stored slack for a fresh termination.



Wire Routing — 4080 and 4082 Cabinets
Fig. 62



Wire Routing — 4084 and 4086 Cabinets
Fig. 63